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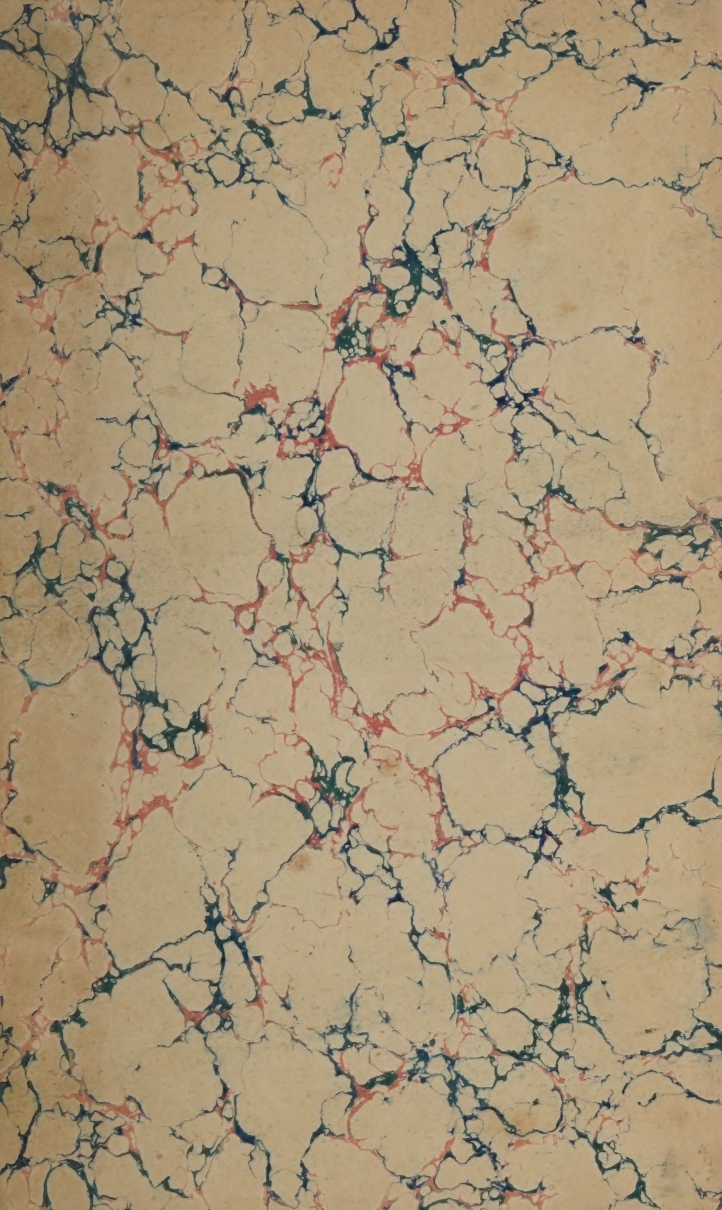
BEE KEEPER'S MANUAL



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# THE BEE-KEEPER'S MANUAL.

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THE

# BEE-KEEPER'S MANUAL;

OR

PRACTICAL HINTS

ON THE

MANAGEMENT AND COMPLETE PRESERVATION

OF

## THE HONEY-BEE.

BY

HENRY TAYLOR.

111

THIRD EDITION:

To which is added an Appendix, with an Illustrated Description  
of the Improved "AMATEUR'S BAR-HIVE," and  
Directions for its construction and use.

LONDON:

R. GROOMBRIDGE & SONS, PATERNOSTER ROW.

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## PREFACE

TO THE THIRD EDITION.

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PERHAPS the original design in offering the following pages on the management of the Honey Bee, to the public, may most appropriately be explained in the words of the first preface. "On reviewing his experience as an "amateur bee-keeper, the author was led to "believe that the result of it, added to a concise "view of such particulars as are usually spread "over a large surface in works of this nature, "and arranged according to the progressive "order of the seasons, might be useful to "others, seeking like himself occasional relaxation from weightier matters in watching over "and protecting these interesting and valuable "insects. Step by step this or that defect of "construction in his hives had been remedied, "and such conveniences added as necessity or the "spirit of improvement from time to time had "suggested. These are briefly described in the "following little work. If it have the good fortune, though in a small degree, to smooth the

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“path (usually a rough and uncertain one) of  
“the apiarian novice,—of removing ignorance  
“and prejudice, or of obviating any portion of  
“the difficulties with which a more general  
“cultivation of bees has to contend,—why may  
“not the contribution of this mite be considered  
“a humble addition to the store of USEFUL  
“KNOWLEDGE?”

The sale of two large impressions of his book, affords the most satisfactory proof to the author that the fruits of his experience have not been offered in vain. In its present renewed and somewhat enlarged form, he has still adhered to his principal wish of consulting practical utility, without unnecessary prolixness; availing himself of the opportunity of another edition to make such corrections, improvements, and additional illustrations, as observation and a continued experience enable him with confidence to do.

London, April, 1846.

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THE  
BEE-KEEPER'S MANUAL.

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TO those who may be unacquainted with the natural history of the domestic Honey Bee, it may be well as a preliminary remark to say that in every family there are three kinds ;

*A Queen, or Mother Bee,*



*The Common, or Working Bees,*



And (during a part of the year,) the *Male, or Drone Bees*



In a community thus constituted, they dwell together in great harmony, working for the general good, recognising one another, but permitting the intrusion of no stranger.

#### THE QUEEN OR MOTHER BEE

Is very rarely to be seen : she is darker, longer, and more taper than the common bees, has shorter wings, and is of a yellowish brown colour underneath. She is armed with a sting, and reigns supreme in the hive, admitting no rival or equal. Where she goes, the other bees follow ; and where she is not, none will long remain. A queen bee has been known to live four or five years ; she is the mother of the colony, laying the eggs from which all proceed, whether future queens, drones, or workers. Separate her from her subjects, and she speedily resents the injury, refuses food, pines, and dies. Without a queen, or a prospect of one, labour is suspended, and a dispersion of the colony ensues. To provide for death or incapacity, preparation is made for a successor, and at the proper season young queens are to be found in various stages of maturity. They are not bred in the hexagonal cells of the common bees, but in much larger ones, which, when complete,

present the appearance of an oblong spheroid, generally appended to the sides of the combs, the bottom being downwards. They vary in number from five or six to a dozen, and sometimes more. The eggs intended to produce future queens are laid after those of common bees and drones, the young princesses arriving at maturity on the sixteenth day. These are successively cast out of the hive if not required; but it is a well-established fact, that in case of an emergency the bees have the power (provided there is broodcomb in the hive at the time) of creating a queen. They select one of the grubs in a certain stage, enlarge the cell that contains it, and by a different kind of nurture a sovereign is reared, and all goes on as usual.\*

#### THE COMMON OR WORKING BEES

Are the least in size, and in point of numbers are variously calculated at twelve to twenty

\* This curious fact in natural history was discovered by Schirach, a member of a society formed in the middle of the last century, at Little Bautzen, in Upper Lusatia, for the purpose of the study of bees. The celebrated Huber repeatedly, by experiment, confirmed its truth; as have many other later apiarians.

thousand, according to the bulk of the swarm; though at certain times they are often much more numerous. As regards sex, from the observations of naturalists, there is every reason to believe they are undeveloped females; and, like the Queen or Mother Bee, each has the power of stinging.

Workers' eggs are deposited in the cells in the centre of the hive, being those first laid by the queen; and are about the size of such as are produced by a butterfly. In four or five days they are hatched, remaining in the larva or grub state four to six days more, during which time they are assiduously fed by the nurse-bees. They then assume the nymph or pupa form, and spin themselves a film or cocoon, the nurses immediately after closing them up with wax. On the twenty-first day from the laying of the egg a perfect bee bursts its confinement. It is speedily cleaned by its companions, and in a few hours has been known to be gathering honey in the fields.\*

\* As soon as the young bee comes forth, the others clear the cell from all impurity, and it again receives an egg; this being often repeated four or five times in the season. Afterwards the cell becomes a receptacle for honey; but with all their attention, the cells are found in time to become contracted or thickened by this rapid succession of tenants.



The working bees have their respective occupations ; some in secreting and elaborating wax, and constructing the cells in the hive ; others in warming the eggs, and rearing the young brood ; in attending on their queen, to whom they are devotedly attached ; in guarding and giving notice of attacks or annoyance from without ; and the rest in searching the fields and woods for the purpose of collecting honey and farina for present and future store. The working bees are short-lived ; there being no reason for believing that they survive a year ; but, on the contrary, it is shewn pretty clearly by Dr. Bevan and others that six or seven months is the limit of their duration.

#### THE DRONE OR MALE BEES

Are computed in the spring at one to two thousand, and upwards, in every good stock hive. They are larger than the common bees ; have no sting, and are easily distinguishable by their louder humming or *droning*. The drones take no part in the collection of honey, nor in any other operation of the hive.

When this takes place it is best to remove the combs, which will soon be replaced with new ones, by the bees.

Drone eggs are laid by the queen in cells larger and stronger than those intended for common bees, and further removed from the centre of the hive. They pass through their various stages in about twenty-five or twenty-six days, the drones being seldom seen till about the beginning of May, and then only in warm weather, in the middle of the day.

Of all the theories on the subject of the part allotted to the drones in the constitution of a hive of bees, (and some of these have been sufficiently absurd,) that of Huber\* is undoubtedly the true one,—the impregnation of the young queens. Perhaps the annual destruction of the drones by the workers is the operation most likely to throw light on the design of their creation. This process varies in point of time according to circumstances. Deprive a hive forcibly of the young queens, and, according to Bonner and Huber, no expulsion of drones takes place. They are retained in case of need, for other queens may yet be produced. Where swarming has become unnecessary, as in venti-

\* See "Observations on the Natural History of Bees," by Francis Huber, new edition, London, 1841. An invaluable work to the scientific apiarian.

lating hives with abundant space, the young queens are cast out voluntarily by the bees. Then frequently commences an early expulsion of the drones: they are rendered useless, become merely consumers of the wealth of the community, and as such are driven ignominiously from the hive, to perish miserably, not one surviving; nor are even those in embryo allowed to escape. This warfare often commences in such hives in the middle, or at any rate towards the end of May, as I have witnessed.\* On the contrary, in the common swarming hives this process does not take place till July, or even August. The circumstances differ in the two cases; and the bees in this, as in other parts of their practice, are sufficiently utilitarians to modify their pro-

\* Bagster, in his work on the "Management of Bees," says "I counted, as early as the 16th of May, 1832, one hundred and seventy five slaughtered drones under the new ventilating method."

Mr. Nutt, the author of "Humanity to Honey Bees," in a note to his last edition, says, "My friend the Rev. T. Clarke informs me that he has two fine stocks of bees that last year (1836) killed and cast out a great quantity of drones early in May; that they both were afterwards prosperous; and that they again killed drones in August, just as if they had destroyed none before. The cause of this curious fact is a problem for the naturalist to solve."

I think I have given the true explanation.

ceedings accordantly. In the one instance the services of the drones are probably not required at all, and a speedy sacrifice follows ; in the other, young queens are left successively to come to maturity. These, once impregnated, become fruitful, perhaps ever after, as is the case with some other insects ; at all events for a year, for eggs are laid by them, and young produced, without the presence of a single drone, except during a few weeks in that period. The destruction of the drones, therefore, may generally be considered an indication that no swarming is meditated by the bees. Dr. Bevan, in his work entitled the "Honey Bee," observes, that "the number of drones may be considered as in accordance, in some degree, with the general profusion of nature ; we find her abounding with supernumeraries in a great variety of instances, in the blossoms of trees and flowers, as well as in the relative number of one sex to the other among animals. Huber conceives that it was necessary there should be a great number of drones, that the queen might be sure of finding one in her excursion through the expanse of the atmosphere, and run no risk of sterility."

Conflicting opinions among apiarians have been formed as to the desirableness of assisting the working bees in the task of expelling the

drones; often a protracted and irritating process. If it can be done at once, without annoyance to the workers, I think much fighting and valuable time may be saved by it; but not otherwise. When attacked, the drones to avoid persecution, will congregate together in a remote part of the hive. Observation led me to think they would at such a time be glad to retreat for still greater safety into a separate box, so placed as to be accessible to them. Accordingly, on the 14th of June, in one of my collateral stock hives, where the drones for a day or two had been hard pushed by the others, I opened a communication on the ground floor into an empty side box. My theory was completely realized, for the poor drones gladly made their way into this, where they remained clustered at the top like a swarm, not a single common bee accompanying them, and would probably have been starved. The following morning I took away the box of drones and destroyed them, counting rather more than 2200, besides some few that had escaped. I did not find among them a solitary working bee; nor could I afterwards discover in the parent stock hive one remaining drone. The bees peaceably at once recommenced work, and did well; as if glad in this wholesale way to be rid



of their late unprofitable inmates. What was the cost of their daily maintenance? And what proportion to the entire population did the drones bear? After this apparently large abstraction, no sensible difference was observable in the crowding of the hive.

#### SWARMING

With bees is frequently an act of necessity only, and then it may commonly be prevented by timely enlargement and decreasing the temperature of the hive. As soon as warm weather sets in, a common hive becomes filled with an augmented population. Every part is crowded to excess; no storing room is left; the heat becomes insupportable, and at length the emigration of a part of the inhabitants must take place. On the occasion of a first swarm the *old* queen accompanies it, usually leaving her successor to the throne still in embryo. About an equal proportion of old and young bees, and (though not without exceptions,) several hundreds of drones, form the swarm.

It is not an unusual thing to hear a boast of a number of swarms or casts (as the second swarms are called) from a stock of bees, which will even sometimes throw off a swarm the first year. Nothing is proved by this but the fact,

that an otherwise thriving colony has been weakened (if not destroyed) by being split up into fractions, which ought to have been held together, as the greatest security against every evil, and the surest source of profit to the proprietor. At all events, the parent stock must not be permitted to be too much weakened by this, and all swarms but the first should be returned in the way hereafter to be described, or united to another.

In the words of Gelieu\*, "in the swarming season the strong hives are almost entirely filled with brood-combs. At that time also honey becomes abundant; and when fine days succeed each other, the working bees amass an astonishing quantity. But where is it to be stored? Must they wait till the young bees have left the brood-cells, by which time the early flowers will be withered? What is to be done in this dilemma? Mark the resources of the industrious bees. They search in the neighbourhood for a place where they may deposit their honey, until the young shall have left the combs in which they were hatched. If they fail in this

\* See "The Bee-Preserver," by Jonas de Gelieu, translated from the French, Edinburgh, 1829. This valuable little work contains the substance of sixty-four years' experience.

object, they crowd together in the front of their habitation, forming prodigious clusters. It is not uncommon to see them building combs on the outside."

In general honey-gathering is altogether suspended, necessarily, under the circumstances just stated, and swarming follows. Can anything be more opposed to the habits of these industrious creatures, or more injurious to the interests of the proprietor, than this state of things? Common sense, and observation of the natural instinct of these little animals, point out the remedy,—viz., a temporary increase of space, which is furnished by nature when the bees voluntarily take up their abode in the large hollows of trees, or under the spacious and well-ventilated roofs of buildings.

#### HIVES, BOXES, FLOOR-BOARDS, AND STANDS.

In their wild state, bees find a secure residence in the decayed trunks of the thick forest trees. Where they are domesticated, the kinds and shapes, as well as the materials of bee-hives, vary according to climate and locality, or the purse of the proprietor. The fact is, that bees will adapt their works with wonderful sagacity to the form of their dwelling; but Gelieu

says they collect more honey in a shallow vessel than in a very deep one.

The hives in most common use in this country are made of straw, of a bell shape, but without any provision for enlargement or ventilation. At the end of the second or third year, they are usually placed over the brimstone pit of destruction, and this closes the scene. Is it surprising that an unpleasant association is thus connected with the use of common hives? Happily for the cause of humanity, modern experience has decided that this consequence is not inevitable; and I trust I shall hereafter point out the method by which it may be avoided in any hive, and make it appear to be greatly the interest of the proprietor never to kill a bee.

*Straw Hives.*—Whatever advantages other kinds of hives which we shall hereafter describe possess, those of straw, from their cheapness, must still continue to be in very general use, and it may be well, therefore, to point out the most eligible mode of constructing them. They are best made of unthreshed rye straw, and may be twelve to thirteen inches wide at the top, and nine inches deep withinside. It is an improvement to make them rather thicker than is customary; and where caps or glasses are to be

used, the hive should be rather flatter on the top than is usual. In the use of straw hives it is common to put sticks across the interior, from a supposed necessity of a support to the combs. But the sticks are only an annoyance to the bees; and there is little fear of the combs falling, except in very deep hives; at any rate it may be prevented by contracting a little to the lower part. The best way of doing this is by working a wooden hoop inside the bottom band of the hive, as recommended by Dr Bevan, who says, "it should be perforated through its whole course, and the perforations made in an oblique direction, so distant from each other as to cause all the stitches of the hive to range in a uniform manner." The hoop gives greater stability to the hive, preserves the lower edge from decay, and affords facility in moving it. I advise a circular piece of wood, (turned with a groove at the edge, to retain it in its place,) to be worked into the crown, having through it an inch and a half hole. With a little ingenuity, the bees may be fed through this opening,—a better method than the ordinary one at the bottom of a hive. A piece of wood or tin will commonly cover the hole; but at times it may be used for the purpose of ventilation, and allowing escape to the

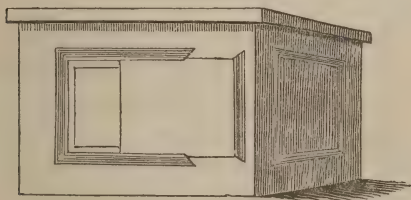


impure air of the hive. In this case a bit of perforated tin or zinc should be placed over it, which, when stopped up by the bees, can be replaced by a clean one. An earthen pan is a common cover to a straw hive, and this may be slightly raised by wedges on the four sides, to permit a small space underneath. Of whatever material the outer covering consists, it must project so far on all sides as to protect the hive from the least moisture. This cannot be too much guarded against; and, whether of wood or straw, all hives ought to be well painted at the beginning, and periodically afterwards; "for," says Mr Payne, "hives managed on the depriving system, are expected to stand from fifteen to twenty years."

*Wooden Hives or Boxes.*—Whatever may be said in favour of straw hives, as a cheap resource for cottagers, there is no doubt of the preference to be given to wooden ones, both in point of durability, and as affording greater convenience to the bees; for a square form is better adapted for the æconomical placing of the combs than any other. My boxes are made of deal, but it matters not much what wood is used, provided it is sound, thoroughly seasoned, and well put together. Different opinions are entertained as to the best size of bee-boxes, but

I think that much must depend on the number of bees they are to contain, and on the honey locality, which varies exceedingly; there must also be a reference to the proposed mode of working them; for where no swarming is permitted a larger hive may sometimes be used. A good size is eleven inches square, and nine inches deep withinside; the thickness throughout being not less than an inch, or, if exposed, a little thicker. The top of the box ought to project on all sides half an inch, for better protection and appearance, and as affording convenience for lifting. On the top a two or three inch hole should be cut in the centre, for placing a bell-glass, or small hive; and for the purpose of feeding or ventilation. In making a box it is best to leave the roof withinside unplanned; if too smooth, the bees have often a difficulty in making the first combs adhere, and they sometimes fall in consequence. A window may be placed at the back and front, or at the end, five inches high, and six wide. The glass should be thick, secured by putty; but it must not fit too tightly, or it is apt to crack from the swelling of the wood. The best and neatest way of securing the windows, that I have seen, is by a sliding shutter of zinc. Round the window there must be a projecting

moulding, mitred at the corners. On one side the piece of moulding is moveable, and to the back of this is screwed a plate of sheet zinc. This passes into a rabbet to receive it, cut, on the remaining three sides, at the back of the lower edge of the moulding. For the sake of uniformity of appearance, blank windows may be made opposite to the real ones. No entrance way should be cut in the box, as this is far better made in its floor-board.



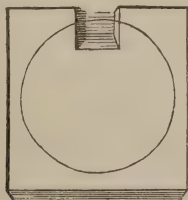
A reference to the engraving will shew a box thus made, with its sliding shutter. It ought to be well painted a sufficient time before use, or the smell is offensive to the bees. Hives of this kind require to be placed under some cover or shed, as protection from wet and a hot sun. The less they have of both these the better.

*Floor-boards.*—The floor on which a hive of bees is placed should be of wood, and not of

stone or any cold material, for this causes the loss of many lives at certain times from chill. Every hive or box ought to have its own separate floor-board, so as to give facility for lifting and weighing the whole together; and it will be found very convenient to have the weight of each hive and board marked on the latter before use. Separate floor-boards are more easily cleaned; and they are indispensable on taking a stock of bees in the autumn on the transferring system, hereafter to be explained.

The entrance into a hive is generally cut out of its bottom edge. This has a tendency to cause decay in that part, particularly if of straw, besides that a hole so made affords but indifferent protection from driving wet or scorching sun, or as giving facility for the escape of moisture from the hive. The plan adopted by me and many other bee-keepers is much better—that of grooving out a passage in the thickness of the *floor-board* in front, gradually sloping upwards into the hive. This groove may be four or five inches wide, and three-eighths of an inch deep where the hive crosses it. Thus made, it is easily contracted at any time by the insertion of small wooden wedges, for it is always better that the requisite

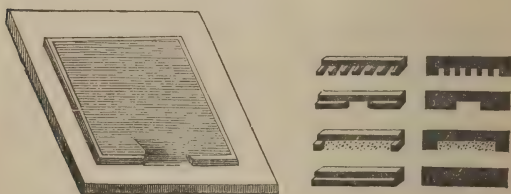
space at the door should be given laterally rather than in height. Under the board it is best to screw a couple of cross bars, an inch thick, to prevent warping, and for convenient lifting.



An improvement on this kind of floor-board, which I have made, consists in cutting a rabbet of two inches wide, and three-eighths of an inch deep, on all its sides. The board should be two and half inches wider all round than the exterior of the box or hive it is intended for; so as to shew half an inch of the raised part of the board. The passage must be cut from the edge of the rabbet, and on the same level, for about two inches; after which it must slope upwards. It may be five inches wide, and its sides should bevel a little outwards. This gives facilities for the use and introduction into it of blocks or mouth-pieces. These are extremely convenient in contracting, varying, or altogether stopping up the entrance

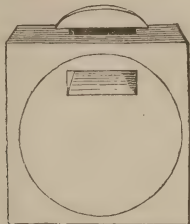


passage, as may be required. The blocks are an inch wide, and must all be of one size ; and of the same length and bevel as the entrance, to fit easily. In height they should be three quarters of an inch in front ; cut down behind, half the width, to three-eighths of an inch. Thus made, half an inch of the block is inserted under the box or hive, and the other half inch projects on the outside. To suit all cases and seasons, blocks so formed may be cut on the lower part, from front to back, with any required passage-way through them at pleasure. The engraving following exhibits a floor-board thus made, with a front and back view of its blocks :—



I know of no floor-board more convenient than the one just described ; but an entirely covered entrance for those who desire it, is afforded by a double board, in which the passage is cut through the floor, altogether within the hive ; and it may be thus made.

Take a piece of seasoned wood, of an inch thick, an inch or two broader and longer than



the hive. Smooth both sides and underneath it cut a groove four or five inches wide, and four inches back from the edge. The part next the edge should be three-eighths of an inch deep, but at the other end, where it is intended to enter the hive, this depth may be doubled, to give more room to the bees. An opening through from the upper side must be made to meet the under passage, giving a gradual slope down into it. A piece of half or three-quarter inch board must then be screwed underneath, the door-way for the bees being of course between the two. Let the grain of the two pieces of wood which this board is made cross each other, which will prevent warping ; and the lower one should project beyond the other, in front, to form the alighting board.

Thus constructed, security is given against wet, and too much light in the hive, whilst

invasion from moths, wasps, &c. is rendered more difficult.

I advise a discontinuance of the useless custom of plastering down a hive to its board with mortar or clay. No cement is equal to that used by the bees themselves, of which they are not sparing; any other only serves to accelerate the decay of the hive: it also presents an impediment in the way of its removal from the board, which, if it can be done readily, ought to take place at the end of winter, for the purpose of scraping and cleaning it; or instead of doing this, a clean floor-board may be quickly substituted, with less annoyance to the bees.

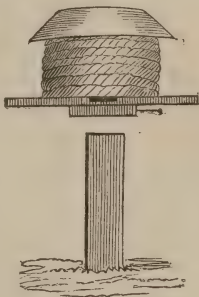
*Bee Houses and Stands.*—If a house is provided for the hives, it ought to be so made as to cause no obstruction to the free passage of air at all times; and openings at the back and ends are essential to convenience. It should not be altogether inclosed, but the projection in front ought to be such as to afford shade in summer, and security against any wet reaching the hives. A covered shed or a veranda is still better than a house, entirely open in front, with space inside for a passage behind the platform on which the hives are ranged.

Where there is no bee-house or shed, the hives may be placed on separate posts or pedes-

tals, about five inches square, standing three or four feet apart, sixteen inches from the ground, into which they should be firmly fixed, as any motion alarms and annoys the bees. Some persons prefer a higher elevation than this: but it is not expedient to subject the bees unnecessarily to the action of the wind, any more than it is to place the hives so near the ground as to cause their being effected by damp exhalations.

There must be no risk of the hives being overthrown, either by the wind, or any other casualty; to prevent which the floor-board should be securely screwed upon the pedestal; or it may be thus done. On

the under side of the centre of the floor-board fix four pieces of wood, of an inch and a half square, so as to form a cap or socket, of that depth, fitting on over the top of the pedestal, the latter being cut flat and square to receive it. In fixing it, however, (and the



same observation applies to all other hives or boxes), a slight inclination forward is desirable to throw any accumulation of moisture that at certain seasons takes place in the hive to its

mouth. On one side of the cap make a hole, inserting a small moveable iron pin through this and into the pedestal, which will render the whole firm and steady. The annexed engraving exhibits a cottage hive and its board, a little elevated from the pedestal, in order to show its construction.

*Enlargement of Hives.*—Different contrivances have been resorted to for occasionally giving extra storing accommodation to hives. The bees, when pressed for room, will carry on their works in almost any direction; or even extend them into a second hive, provided a communication is given from one to the other, whether placed laterally, at the bottom, or on the top. The latter position is the one most commonly adopted. A second box, superhived upon the stock one, is termed a *duplet*. On this is sometimes placed another, called in this case a *triplet*. An empty box pushed beneath a full one is denominated a *nadir*. A still smaller enlargement of a common hive consists merely of a hoop of wood or straw, on which it is raised, and this constitutes an *eke*. In all these contrivances the object in view is a larger collection of honey, giving at the same time facilities for taking it, without resorting to the suffocation of the bees; and this is done by

removing the extra hive or box when filled. The same means are likewise more or less effectual in retarding, or altogether preventing, the separation of a family of bees by the throwing off of swarms.

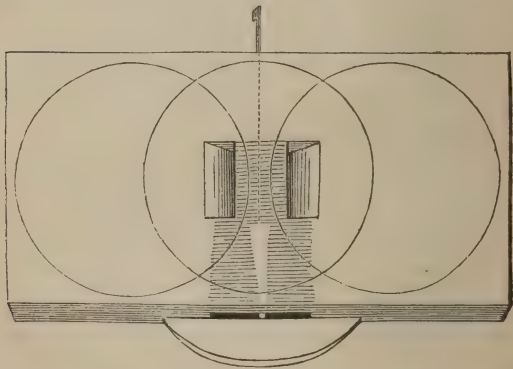
The advocates of storifying or piling of hives are numerous, and no doubt it possesses some advantages when original outlay or room is an object. In particular, Dr. Bevan strenuously supports it, and gives ample details of his hives, with and without comb-bars, and their mode of management, to those possessed of the needful courage. Mr. Payne also, in his "Apiarian's Guide," has pointed out an economical method of proceeding, based on this plan, for the use of cottagers; and in his own district (Suffolk) it has, I believe, been attended with great benefit to them.

*Collateral Hives.*—These being usually more expensive, and requiring greater space than most others, have not till recently been very generally used. The comparative ease, however, with which they are worked, the saving of time and labour in climbing to the bees, the check they commonly present to swarming, as well as the facilities they offer for a large collection of honey, in good localities and seasons, all combine to recommend them favourably to



the apiarian. To Mr. Nutt we are indebted for bringing into recent notice the collateral system, though it was well known and published many years before our own time ; and several expedients have of late been resorted to for arriving at the same result by adapting the principle to common hives.

I have seen various modes of working hives side by side, but a very simple one has been practised with success by a correspondent. I have adopted his hint, but with certain modifications and improvements. A reference to the engraving will at once show the construction



and design of this apparatus, which may, with propriety, be termed a *doubling-board*. It is formed of a plain board, not less than an inch

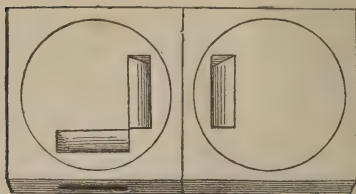
thick when dressed on both sides. It must be seventeen or eighteen inches wide, and long enough to contain, side by side, two straw or wooden hives, with six or eight inches to spare. A stock hive is in the first instance placed over the centre circular mark, within which is the double outlet for the bees. When more space is required, it must be moved over one of the side circles, and a second hive placed over the other. There is a communication within the floor-board from hive to hive. The part hollowed out for this purpose is five inches wide, six inches long, and half an inch high inside, a sloping way being cut on the two further sides down into it. Two covered passages lead from this, terminating at one point on the alighting-board. The bees, having been accustomed to both these passages, readily take to the second hive, and commence working therein, whilst the breeding process goes on uninterruptedly in the original one. In order to show the position of the parts hollowed out, these are slightly shaded in the engraving. They are cut from the bottom side of the board, in the way described at page 21. The two entrance passages are each three inches wide, and three-eighths of an inch high next the alighting-board, gradually extending to the height of half an inch at the

other extremity. A second piece of wood, three-quarters of an inch thick, and nine or ten inches wide, must be screwed to the under side, to inclose all the openings. This ought to reach back nearly the whole width of the upper board ; at the same time it should project far enough in front to form the alighting-board. Another cross piece may be screwed to the under side at each end, and thus any warping will be prevented.

When it is required to take away one of the hives, the communication below must be cut off between them. This is done by means of a divider of strong tin, copper, or iron, pushed in from behind in a groove cut edgeways in the bottom side of the main board, and resting on the under one. The dotted line in the engraving shows the position of the divider, which must in depth be the same as the passage between the two hives, so as, when in its place, to stop it entirely across the centre. The addition of a window, and a ventilator, placed in one or both of the hives, will sometimes be found of utility.

In America, where bees are very extensively kept, the advantages of working hives together on the same level has not been unobserved, and a recent writer thus details one mode of pro-

ceeding adopted by some apiarians there. "Their plan," says he, "is invariably to keep the bees in open sheds; and instead of permitting the hives to throw off swarms annually, to *compel* them to take possession of new hives as often as may appear necessary. When a hive gives indications of throwing off a swarm, it is slidden back upon the platform where it stands, and a new hive, with an opening or passage *behind*, corresponding exactly with that in the old one, is pushed up close against it; so that the bees are under the necessity of passing through the new one whenever they go abroad; and in this new apartment the colony, which would have now been thrown off as a swarm, commences operations." This appears simple and practicable; but, to act well, the hives and their boards must fit very closely together. There is also a necessity for an extra small opening at the back or side of the stock hive, for better ventilation, and as a saving of time to the bees; for, when slidden back, the distance from the mouth is considerable. On the whole, I prefer placing the two hives side by side, rather than front and back, as shown in the engraving, in which the stock hive is supposed to occupy the right hand board. The same result follows, with greater convenience,



and better ventilation. The two boards must be made on the double plan, as recommended page 21, precisely alike in size and thickness, with the entrance passages cut out from beneath. There must, however, be two entrances to the board intended for the second hive,—one in front, and the other at the side; and I recommend that all the doorways, in hives to be thus worked, be not less than six inches wide. A wedge or two of wood will at any time contract them when needed. With boards thus constructed, it matters not what is the material or shape of the hives. When room is required, the first board with its hive must be moved so far sideways that the second one can precisely occupy its place. At the same time it must be turned half round, so that its mouth and that on the side of the new hive meet and fit close together. The bees inside will be conscious of no change, and will pass without suspicion into the other hive on going out; on returning it

will be the same, for the doorway and alighting-board (which ought to be a fixture) will remain where they have been accustomed to find them. To assist the deception, the exterior appearance of both hives should be alike. All that is further required is to see that no wet gains access between the now united boards. Of course, on removing a full hive, the other must be restored to its original position, and here it must remain in winter. As a precautionary measure, I advise the use of a ventilator in one or both of the hives thus worked ; or at any rate a hole at the top ; for when the second hive is added, the heat will probably rise in the first.

*Nutt's Hives.*—The plans we have hitherto noticed as applicable to hives placed together on the same level, only suppose two to be employed ; but Mr. Nutt has introduced *three* boxes, as forming a set. To those to whom cost and room are of no consequence, these are offered ; and as greater facilities for enlargement are afforded, and more ample means provided for ventilation and the use of the thermometer, with a view to the prevention of swarming, they have been much patronized.

These three boxes are placed together collaterally, with an entrance from the centre box to the side ones, each way, through what may be



termed a pyramidical grating; which communication can either be open, or cut off by means of a sheet of tin (called a divider) pushed between. The centre box Nutt terms the *Pavilion*, into which the bees must be originally hived in the swarming season. The pavilion must never afterwards be disturbed, it being the place of residence and breeding of the queen. At the proper time, as more space is required by the bees, it is given by withdrawing the divider. They then take possession of one or both of the side boxes, which when filled with honey are removed and emptied, without any injury to the inmates. Underneath are drawers for feeding, &c., and on the top is an octagon cover, under which may be placed bell-glasses if required. There are also holes on the top of the side boxes for the reception of ventilators

#### IMPROVED NUTT'S HIVE.

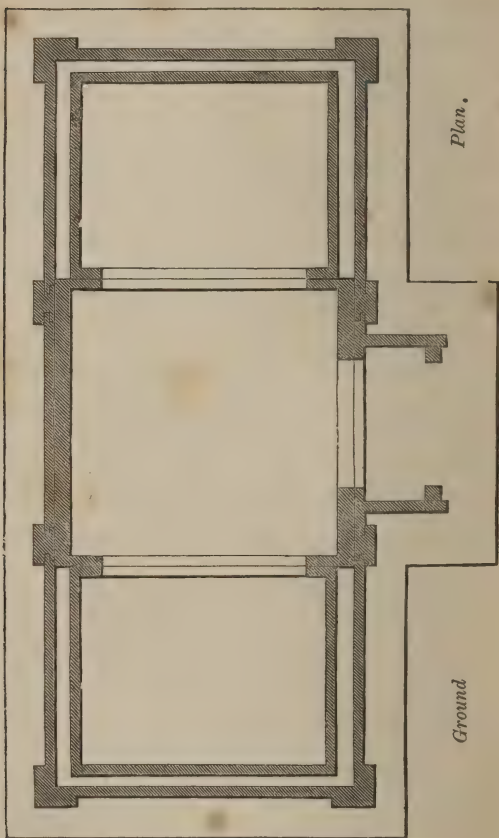
Although I like the principle of collateral hives, in certain favourable localities, yet in the general working of them, as made by Nutt, I have found several practical disadvantages, which a little attention and perseverance have enabled me, I think, to overcome. Without departing from essentials, I have altered the form and arrangement of the boxes, and made a set com-

plete as a whole, without the usual necessity for an additional shed over it, as a protection from the weather, which detracts altogether from any picturesque appearance it might otherwise possess.

In a very favourable bee district, where it is intended to hold more than one swarm, the pavilion may contain fourteen or fifteen hundred cubic inches. I have seen one, in great prosperity, for several years, of a much larger size than this.\*

The pavilion is made of three-quarters of an inch deal in the back, front, and top, and half an inch at the sides. At each end is a good-sized window, which is all the stronger and better if made of plate-glass, and not fitted in too tightly. Over the windows slide down

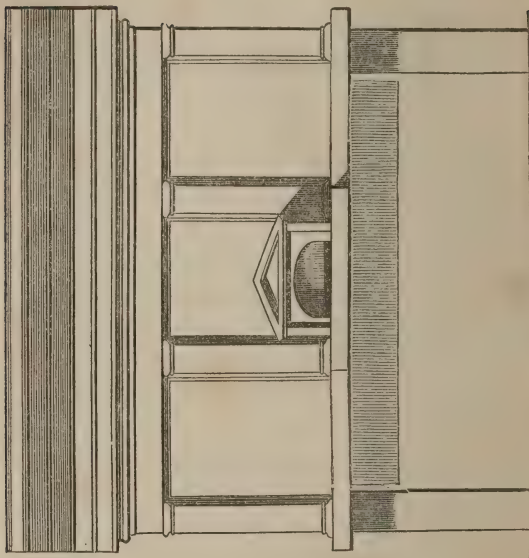
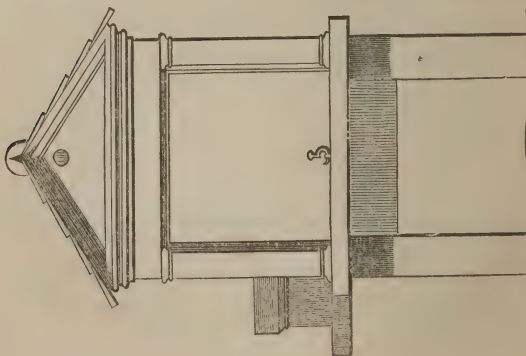
\* Much diversity of opinion exists on the subject of the best size for collateral bee-hives. Circumstances, I think, must determine it according to locality, for what is suitable in one place will not do in all. The dimensions I prefer for the larger sized pavilion are twelve inches square, and nine inches deep: the side boxes eleven by nine inches, and eight or nine inches deep; but this is only in good localities. A smaller set of boxes may be thus proportioned; eleven inches square, and nine inches deep; with side boxes ten by eight and a half inches, and eight inches deep. The dimensions here given are clear measure, and severally accord best with the exterior proportions taken as a whole. However these may differ, it does not affect the principle of the system.



moveable half-inch panels, into grooves made in the pilasters\*. The latter may be two inches wide, and either flat, or semi-columnar in form, and are screwed to the pavilion. To the panel in front is attached a covered porch, projecting four inches, as a shelter from wet, wind, and too much sun, all evils at the mouth of the hive. To make this more effectual, a moveable piece, cut in the form of an arch, slides within the porch. The top of the side boxes is made with a projection of half an inch at each end, for convenience of lifting. They have each two windows, and are protected by cases covering the three sides, and fitting at the extremity into the grooves of the centre pilasters. In this way are formed, on the outside, panels to correspond, and of equal size with those of the pavilion. The cases are strengthened by cross-ties near the top, and at the corners by pilasters to match those of the centre. Thus every part of the boxes is doubled, excluding all light and wet, and superseding shutters to the windows, which are rendered inaccessible to idle curiosity.† I

\* The panels should fit loosely to allow for the swelling of the wood; as indeed ought all the parts liable to this.

† There is nothing to prevent outside shutters over openings in the panels before the windows, but I think they are much better omitted.

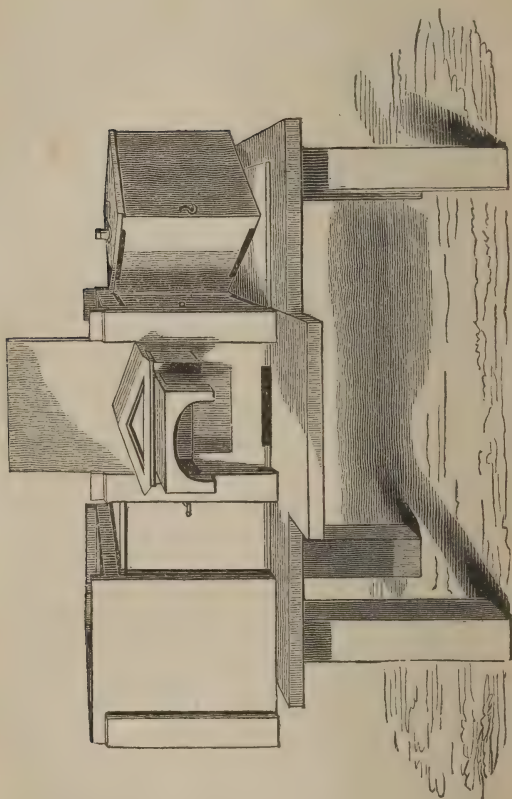
*Front Elevation.**End.*

never found that, where the boxes were made of one thickness of wood, however strong, the same security was afforded against the influence of the sun and sudden changes of temperature (at all times to be guarded against,) as is the case when there is a double cover, though on the whole of no greater thickness than the single one. The space for air between easily accounts for this. The side boxes and outer cases may be made of half or three-quarter-inch wood: they are secured in their places by hooks and eyes to the floor-board at the ends.

A weather-boarded roof fits over the whole like a cover, resting on the tops of the pilasters, which are cut down about an inch to receive it, allowing ample ventilation, with perfect protection from sun and wet. Height is left inside for placing bell-glasses, and a couple of two-inch holes are made in the top of the pavilion for this purpose, to be stopped at pleasure\*. There is also a hole in all the boxes for the reception of the ventilation tubes. These are placed near the back windows, for convenience

\* These holes should not be cut in the centre, but towards the sides, and in accordance with those of the feeding-pan. Here they are accessible to the bees without the usual necessity of passing through the centre of the hive, which is the seat of breeding.



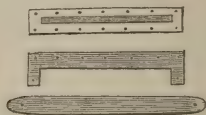
*Separated Plan.*

of ready inspection, and are there less in the way than in the centre of the hive, both in forming the combs, as well as in the operation of emptying a box of honey. This position possesses the further advantage of preventing the bees from placing one of their combs across or in front of the window, by which obstruction a perfect view of the interior is sometimes shut out.

The communication between the pavilion and the side boxes is made in each by two lateral openings, half an inch high; one being on a level with the inside top of the side box, and extending the whole distance. Thus situated, it is peculiarly useful, as allowing a passage for a straight carving knife, or spatula, with which to cut the combs from the top when a box of honey is removed,—a difficult matter otherwise, where instruments for the purpose are not at hand. The bottom openings are on the ground level, and ought also to extend all the way. They are stopped, when required, by slides, or dividers of strong well-straightened tin, of an inch and quarter wide, inserted from behind,\* let into

\* The slides need not come through the outer cases, as by bending the extremities a little, there is space enough within for as much projection as is necessary for holding them, when required to be withdrawn. To avoid any difficulty when these

the boxes their own thickness, and there loosely kept by cases or strips of tin, cut to correspond with the openings. The tins may be about two and an half inches wide. Their form, and also that of the slides, is shewn below.



In fixing the tin case at the bottom opening, its two lower extremities must be turned or lapped under at each end of the box, as a support to the slide on lifting. In Nutt's hives no separate dividers are provided to the side boxes; but for greater convenience, I make them in this respect all alike. The tin cases must be adjusted to the boxes, so as to present a smooth exterior surface. This part of the boxes differs from Nutt's, which have numerous apertures between them. These I have found are not only useless, but practically injurious, as the bees will frequently unite the combs through them. The difficulty of separating them when this is the case is not

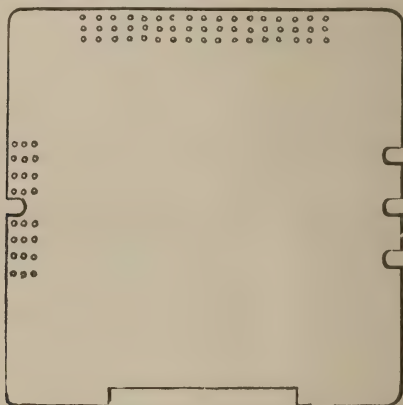
are used, the pilasters at the back of the pavilion must not project beyond the square of the box; or, otherwise, they may be made moveable.

the least evil ; for the queen is often tempted to pass by these points of union into the side boxes and deposit eggs there, which not only gives occasion to much irritation to the bees on the removal of a box of honey, but, by causing a mixture of brood and pollen with it, injures its quality. The inutility of numerous openings is further proved by the fact, that the bees, when wanting the room, will readily take possession of a side box, if even but one opening is provided.

At the entrance door of the pavilion are two slides of perforated zinc, about an inch wide, moving at the back of the panel, and behind the pilasters, right and left, so as to contract the mouth at pleasure. There is nothing better than this, as the aperture may be decreased without diminishing the supply of air. This opening ought not to be less than five or six inches long, and three-eighths of an inch high, the floor-board being cut away in a slanting direction upwards from the rabbet to form it.\*

\* There is nothing to prevent the adoption, in a hive of the kind now described, of the entrance from beneath the floor-board, as described at page 21. In this case the portico and its adjuncts are unnecessary. Some persons also prefer a small opening from each of the side boxes, as an outlet, or ventilator, for the bees, when much crowded, in hot weather. On removing a box of honey, this is also useful. These open-

In lieu of the slides, may be substituted, if preferred, a square sheet of well-flattened tin, zinc, or copper, of four equal sides, made to slip down in the grooves of the centre pilasters, behind the moving panel. Each side of the



square gives an altered mouth to the pavilion, at pleasure, according as it is turned, being cut with various-sized apertures, and one entirely closed except the perforations for ventilation.\*

ings are best made at the front extremities, withinside ; and may come through the floor-board in a slanting direction, so as to open immediately under its projection. A strip of tin or zinc may be pushed under the box, to close the hole at pleasure.

\* This very simple contrivance may be adapted to any hive of a square front, by the addition of two ribs of wood

The floor-board should be one inch and a half thick, and must be prevented from warping by a cross-piece under it. It should project a little on all sides, with a slope to throw off wet. To make sure that none can get to the boxes, a rabbet of three-eighths of an inch is worked round the floor-board, and on this stand the outside panels and cases, excluding any rays of light, as shown in the annexed section.

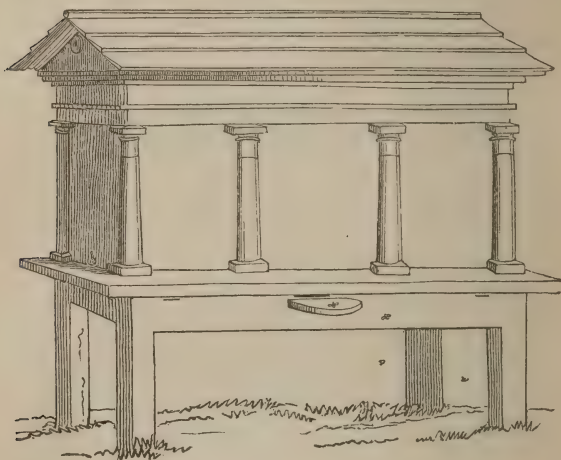


The pilasters which are attached to the pavilion must be made so much longer than the box as to reach to the rabbet. The floor-board is best fitted down to four posts, two and a half inches square, framed together with a rail, like a table, about eighteen inches above the ground, and sunk as much beneath it, as the whole cannot be too firm and steady. In thus fixing the stand, it is not amiss to give a slight inclination forwards, so as to insure a fall for any moisture, which at times will accumulate in the hive, and should be conveyed to the mouth.

fastened to the latter, with grooves to admit the plate, it being made the whole width, or of any more convenient size.



With proper fastenings to the roof, the hive is rendered perfectly secure from depredators of every kind; and if well made, and painted occasionally, it will be extremely durable; but no paint should be put on the floor under the portico; and I recommend the inside of the roof and of the panels to be blacked.



I think in practice, the hive now described will be found to combine many advantages of construction for easier working than those usually made on this principle. With no absolute neglect of exterior, the first object in

view was utility, without superfluous expense. Where more embellishment is required, there is doubtless scope left for the artist.

After all, situation, and the degree of care and attention bestowed by individuals, vary so much, that it is not to be wondered at that frequent conflicting opinions should have been formed as to the profitable results of this mode of working and managing bees. In all cases of disappointment, great allowance must be made, for the principle that is well adapted to one locality, or season, is ineligible in another.

#### IMPROVED WHITE'S HIVE.

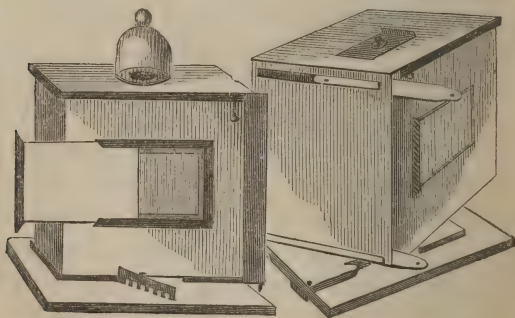
As regards collateral bee boxes, after all, we chiefly owe any advantages they may possess to the Rev. Stephen White, who introduced and described them nearly a century ago.\* His plan, however, only requires *two* boxes, placed side by side, with communication at pleasure. By these every convenience is obtainable for the required object, with much less outlay, and a greater economy of space, than when *three* boxes form a set. Whether White's plan was

\* See "Collateral bee-boxes, or a new, easy, and advantageous method of managing bees," by Stephen White, Holton, Suffolk. London, three editions, 1756, 1763, and 1764. My own copy is of the latter date.

extensively followed, I do not know; but his hives, made as he describes them, certainly shewed no great constructive talent, and worked very clumsily. This is not surprising; as he tells us, "my deal boards, assisted with all the mechanical skill that I and my ingenious carpenter are masters of, have been jumbled together in such a variety of wrong and ineffectual forms, and been almost forty years in making a bee-box." What the inventor and his "ingenious carpenter" thus so long ineffectually laboured at, I have endeavoured to perfect; and, as improved by me, these hives are extremely simple, being, as I think beyond all others, easy of management; and possessing at the same time certain facilities peculiarly their own. My boxes are made, at least on three sides, in every respect, and with similar windows, like the one described and shewn at pages 15 to 17. Both are alike in their construction; and it is essential to my plan of working them, that their front and back elevations should present precisely the same exterior appearance. They may be ten and a half or eleven inches square, withinside, and nine deep. The sides of communication are of half-inch wood, with an opening half an inch high, at the top and bottom, extending the whole distance, for

reasons given at pages 39 to 41 ; where will also be detailed the mode in which the communication from box to box is made and cut off ; with an illustration of the requisite tin cases and slides. These must be fitted to both boxes, so as each may be removed independently of the other, the slides drawing out at either end at pleasure. Holes should be cut in the top for glasses or caps, and for ventilation. Each box must have its separate floor-board, and these should, on three sides, be made like the one described and shewn, page 20, and with cross bars underneath. The remaining side is not to be rabbetted, but both boards and boxes must be fitted to come level together, as closely as possible. To make this union complete, an upright moveable piece of wood, the height of the boxes, one and three quarters of an inch wide, and half an inch thick, is provided, both at the back and front. By means of pins at the bottom, and a hook and eye across at the top, these uprights serve to connect and fix together the boxes, with their respective floor-boards ; and at the same time to close from light and air the space between them. A similar piece may go along the top, for the same object. The tin slides, being left for convenience rather longer than the boxes, their

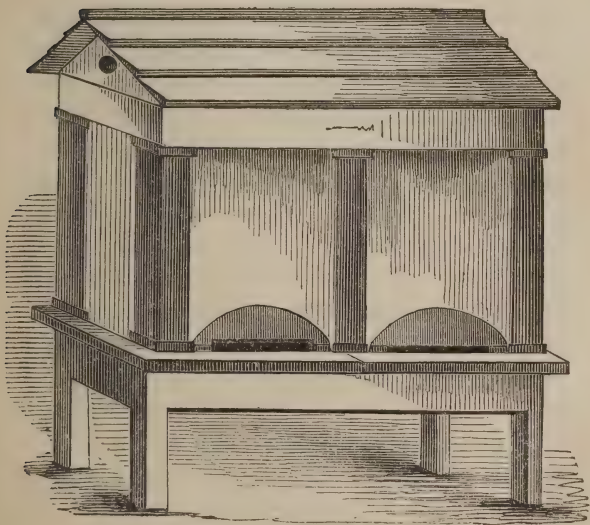
projecting ends can, without difficulty, be concealed by the moveable upright pieces just described, recessed out at the back in the requisite parts. It is almost unnecessary to say, that no entrances are to be cut from the boxes themselves; but the floor-boards must be so made, as that half an inch of the raised part shews beyond the box, on the three outer sides. The mode of cutting the entrance ways in the boards are detailed and shewn at page 20; but for reasons we shall presently see, as regards the hives we are now describing, entrances must be made not only in front of each board, but on the hinder side as well; so that for the two hives there will be four doors. They



should all be precisely alike, to admit the use of the varied mouth-pieces or blocks, also

shewn at page 20, which are essential in our future operations. The description will at once be clearly understood by a view of the plan in the preceding page, shewing the boxes, with their boards, &c., a little separated.

The whole may be placed in a common bee house, or under some covering from the weather, and hot sun. In the absence of a house, a separate stand and cover may be made, according to the taste of the proprietor. The engraving following shews one on a simple





mode of construction, and combining every requisite for utility, safety, and appearance.

The bottom part or stand is merely a frame ; and it requires no top, as the floor-boards themselves are intended to fit into it, and rest upon its upper edge, with a projection all round of an inch. By this means the boards may at any time be lifted. The cross bars on the under side of the latter must be so cut and fixed on them, as to fit within the frame, but not too tight ; and in this way the boards are kept in their places. From front to back, in the centre of the frame, is a cross piece, sufficiently sunk ; serving at once to stiffen it, and to form a joint underneath where the two floor-boards meet. A framed case or cover to the whole, with a weather-boarded roof, drops on loosely, and rests within an inch of the edge all round of the boards. This need not be heavy, and is readily lifted off when required ; but it should be high enough to receive the bell glasses. In front is cut a good sized elliptical opening, corresponding to the working entrance into the box ; and for uniformity, a similar one is made opposite the blocked door in the other hive. There must, however, be no such openings at the back. The whole exterior should be well painted, not excepting the two sides of communication in the boxes.

In the season, hive a swarm into either box, shutting off the communication with the other; and stopping with the blocks, already mentioned, all entrances, except the one in front of the now occupied hive. When it is required to give the bees admission to the second box, my plan is at night to lift the latter and its floor-board from its place. The full hive must then in a similar manner be removed, turning it quite round, and placing it where the other had just before stood. In short, the two boxes change places, and what was previously the back of each becomes the front. The entrance door to the stock box, hitherto in use, being now behind, must be blocked up, and the one in front of the *empty* box opened. Withdraw all the tin slides, and the bees are thus compelled to pass solely through the latter. On coming home they are at no loss, for the exterior entrance is still at the identical spot where they have been accustomed to fly; and indeed it must never under any circumstances be anywhere else. The outward appearance of the boxes, also, being precisely the same, however placed, assists in the deception. To reach the stock box, the bees must go through the other, which in consequence is at once occupied; and here they begin most conveniently to

work ; nor do they often afterwards abandon it, as is sometimes the case on the *three-box* system. If in consequence of the revolutionary proceeding just detailed, the stock box should appear to be suddenly too hot, the hole at its top furnishes the means of ventilation, or capping. As regards the prevention of swarming, these hives may be so managed as to give equal facilities for the purpose with any other ; but their worthy inventor thought this was far from being a recommendation ; for he tells us that the swarming of his bees “is a pleasure I ardently look and long for every spring ; and which I am more delighted with than all the other pleasures of the month of May.”

We shall hereafter, at the proper season, give the method of proceeding when a box of honey is to be taken, which is much the same in all hives. After such an occurrence, the two boxes must again change fronts, so as to return to their respective original positions. The stock box, now in its former place, must have its first entrance door restored, stopping up every other in both boxes for the year, and pushing in all the tin slides.

I have already expressed an opinion that these improved hives possess many advantages. Indeed the experience I have had in their use

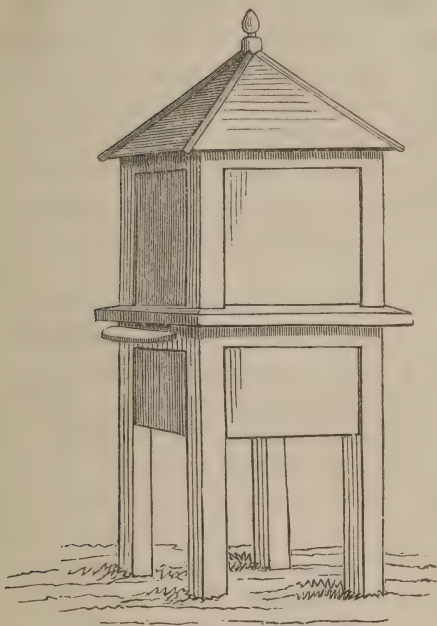
convinces me of their superiority in all essential particulars, over the *three-box* arrangement. It is only in rare circumstances that more than two boxes are required at once; and, in case of need, my White's hive is perfectly provided with means for the use of glasses or upper boxes. A great advantage is gained by the separate floor-boards, not obtainable elsewhere. These render the boxes of such easy and safe management, that it may be undertaken by the most timid operator, giving to the bees themselves no disturbance whatever; whilst moving, cleaning, weighing, &c., are at any time practicable. An objection frequently urged against the *three-box* system, is the difficulty, on any occasion, of getting at the centre one, or of removing its old combs when needed. This evil is entirely remedied in my White's hive, which affords the means of totally renewing these at pleasure. With my two boxes either of them can be converted into the stock one, by periodically emptying the old box, and leaving the other, in which the combs are all new. This may be done in the autumn, after the brood is matured, every second or third year, as seems needful. The queen will probably be occasionally in each box, and her presence is readily discoverable by pushing in the slides, opening

at the same time the entrance, when the proper opportunity must be seized. The second box thus becomes the breeding one, and must take its place on the stand accordingly.

#### NADIR HIVE.

The disposition in bees to work downwards, in preference to climbing, when it is possible, is well known; and they not unfrequently take advantage of a hole or crack in the floor to commence building combs underneath it. Deriving a hint from the bees themselves, I have constructed what, from this peculiarity, may be termed by way of distinction a *Nadir Hive*, the second box being placed underneath that containing the stock.

The upper or stock box may be eleven or twelve inches square, withinside, and nine inches deep; of not less than three-quarter-inch wood throughout; with a window, back and front, of five by six inches. To all the outer angles of the box are fixed what may be termed pilasters, one inch thick, and two inches wide. A groove or rabbet is cut on the inner side of these, about half an inch deep and wide, for the reception of panels, of half-inch wood, made to slide up and down within the grooves, and resting on the floor-board. If



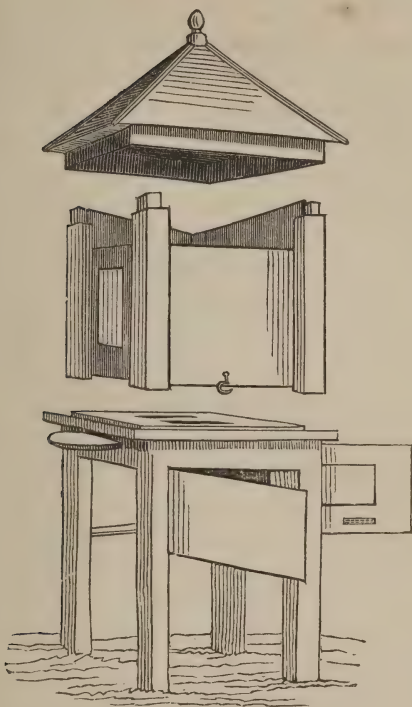
preferred, the sliding panels may be made of zinc plates; and these are less subject to warping and swelling than wood. But they ought not to be allowed to touch the box, as a small space for air is desirable in order to moderate the too sudden changes of temperature. The



box is thus cased over, the four sides showing equal panels, recessed half an inch within the pilasters. At the top of the box is a two-inch hole, in the centre, for a bell glass, and for feeding; and another hole, (next one of the windows,) to receive a ventilator. Height is left under the roof for these purposes, and consequently it is necessary that the pilasters and panels should be higher than the box itself by about four inches.

In order to allow the means of cleaning the floor-board in winter, without disturbance, an opening of half an inch high may be cut on the bottom edge of the two sides of the box, nearly its whole extent. This is covered, when not in use, by a strip of strong tin, fitting into a recess, cut its own thickness, in the box. The tin must go down and rest upon the rabbet of the floor-board, and is retained in its position by passing behind the same hook that is used in fixing down the box.

The cover consists of a frame, two inches deep, of equal size with the exterior square of the pilasters; the four sides of the roof being hipped to the centre, and the angles made tight by neat ridge-pieces. It should have a projection all round of about one inch and a half to carry off any wet, and under it a few ventilation



*Separated Plan.*

holes may be made. The top falls on, resting at every corner on a shoulder, cut down about three quarters of an inch from the outer edge of

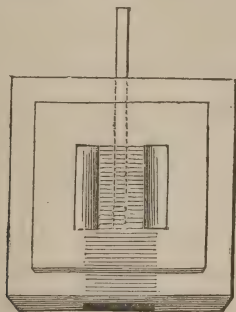
each pilaster, and thus makes the whole impervious to wet.

The floor is a square board, not less than one inch and a quarter thick, and large enough to project an inch all round from the pilasters. This part should be a little sloped to throw off water. To prevent access of this at the bottom of the box, a rabbet of a quarter of an inch should be cut round the board, as far as the exterior square of the box. The latter stands on the raised part of the floor, (to which it may be made fast by a hook and eye, on the bottom of each side,) but the pilasters and panels must be made to go down to the rabbet.

The floor-board is supported by four legs, two inches square, framed together, on three sides, with a rail. On the fourth side, (which is behind) the rail is a moveable one, for the purpose of allowing the introduction of the under box. The two side rails should be two inches square, and those at the back and front two inches by one inch thick.

To form the outer entrance and the passage down to the lower box, the floor-board is cut underneath in the way described p. 26, except that in this case, one doorway only is wanted, instead of the double one. This should be five inches wide, and three-eighths of an inch high,

next the outside, (where it may be made to terminate just under the projection of the floor-board,) increasing in height to nearly double this as it enters the hive.



Connected with this passage, two parallel openings are cut six inches backwards in the floor-board, having the space comprised between them hollowed on the under side, as in the board before alluded to. Down to this the way is sloped on the two further sides. In the engraving the parts hollowed out are slightly shaded. To form a bottom, a piece of half-inch wood, fitting very exactly into the square within the legs, must be screwed underneath. Through the centre of this, is cut an opening from front to back, six inches long, and half an inch wide, being the way down to the under box. The latter thus becomes perfectly accessible to the

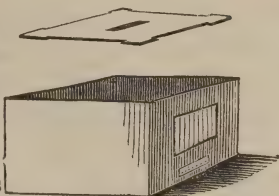
bees, at the same time that a possibility of their working and connecting the combs downwards, through the opening, is prevented.

The alighting-board is moveable, and rests in a groove cut below the entrance. When it is necessary to contract this, a piece of wood may readily be slipped between the alighting-board and the projection of the floor-board.

In order to shut off the communication with the lower box, all that is requisite is a flat strip of thick tin, about an inch wide. Its point of insertion is at the back, behind the moveable rail, and it passes between the two boards of which the floor is composed, in a groove cut to receive it in the lower one. Its position is shown in the engraving.

We now come to the under box, which must be made two inches larger from back to front than from side to side. It should be of one-inch wood, in depth ten inches withinside, and open at the top. By removing the back rail, it is pushed into its place like a drawer, resting below on a support fixed crosswise from leg to leg of the frame, thus occupying all the space inclosed within the rails. On the two longest sides of the box are the windows, and these are covered by doors, hung to the legs of the stand.

The doors should be so fixed as to make the recessed part (one inch) between the legs correspond all round. Beneath the windows



are lateral openings with perforated slides for the sake of ventilation; and an occasional outlet, if required, for the bees, may be made in the front or bottom.

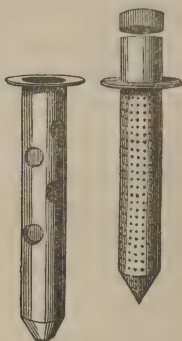
It only remains to describe the top or cover to the under box, which is a movable piece of three-quarter-inch wood, fitting its own depth into the box, within which it rests upon wire projections in the four corners. An opening of six inches long must be made in it, corresponding in position exactly with the one through the floor above, but it may be a little wider than this. The four edges of this top, with the exception of a little space at the angles, are cut away about an eighth of an inch, to form a recess down which to pass a knife or spatula, to separate the combs from the sides of the box on emptying it. Having done this, the top board is readily raised up from its place, bringing the combs suspended to it. The engraving shows the lower box, and its moveable top.

The *Nadir Hive* may be made at a moderate

cost, and unites simplicity in appearance and operation with perfect security. To the bees this construction is very convenient, the way down being as short as that upwards; and for the purpose of storing honey it is well adapted, for the under box may always be rendered cooler than the upper one.

#### VENTILATORS AND THERMOMETER.

The ventilators I use in some hives (and I have made them of various forms) consist of



double tin or zinc tubes, both resting on a flanch or rim, in the holes prepared for them. The outer tube is of one inch diameter, and six inches long, with six half-inch holes dispersed over it. It is soon fixed down in its place by the bees, and so must remain. The inner tube



is of perforated zinc, with a tin projecting top as a handle, and a cap to put on or off this as required. The bees will stop up the inner tube where they can get at it, when it may be turned round a little to present a new surface. When wholly stopped, it can be withdrawn from its place, and a clean tube substituted. This may be done without the least danger to the operator; but it should be inserted carefully, to avoid crushing any bees that may have crept within the outer tube. An exit of these is afforded by the hole at the bottom. The tube that has been thus removed may be cleaned by the aid of hot water.

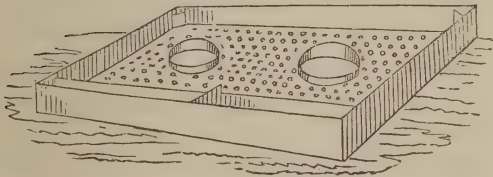
In order occasionally to know the temperature of any of the boxes, a thermometer, made to fit the ventilator, may be inserted in it. This will at all times give facility for making accurate observations, but it is more particularly useful towards the swarming season.

There are some who think the ventilating apparatus and thermometer unnecessary adjuncts to any hive. I do not contradict, that it is practicable for an *experienced apiarian* to do without them,—but with amateurs there is hardly the same degree of *certainly* of management; nor will bees work as well in an extremely heated atmosphere as in an agreeable

temperature. No argument against the utility of ventilation can be drawn from any supposed antipathy of the bees, in consequence of their natural propensity to stop up every little crevice wherever found in a hive,—a practice more particularly observable towards the close of the working season, when the hottest weather prevails, and a change of air might be expected to be the most acceptable to them. But in truth this is not a question of ventilation at all, as regards the bees, for I have always remarked an equal activity among them in stopping the tubes with the caps closely fitted on, and when not the smallest current of air could by possibility pass through them, as when they have been left altogether open. In short, it is one of their habits to leave no aperture unclosed, particularly if light is admitted. However, as some persons care nothing for the use of a thermometer, and believe that a ventilating tube is in the way of the bees, I should in that case use a piece of perforated zinc or tin, which answers very well, laid over the hole on the top of the hive or box. This is easily renewed, when stopped up, and to prevent the admission of light, it may be covered by a box, or cap.

## THE FEEDING-PAN.

The feeding of bees, though apparently a trifling matter, is generally a troublesome and somewhat dangerous process, and often causes much fighting and loss of life. I never experienced anything of the kind with my apparatus, which is adapted for feeding on the top instead of the bottom of the hive, as is usual. In this position, food may be given in any quantity; it is more convenient to the bees, and less commotion results than when placed elsewhere, besides that it is there inaccessible to any kind of enemy. It consists of a tin or zinc pan, twelve inches by seven inches, on the outside, and one

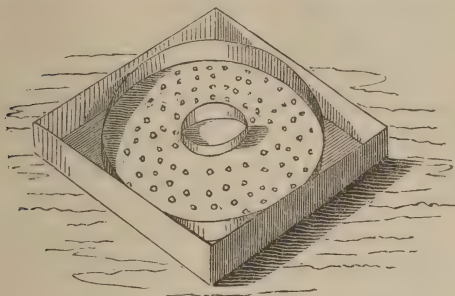


inch and a quarter deep, made very flat at the bottom. A partition runs the length of one side of the pan, leaving a space of an inch wide, into which the food is poured, a passage

for this being left all along under the partition an eighth of an inch high. It thus finds its way into the centre, where there is a thin perforated wooden bottom, a little raised underneath, and which floats on the food. The bees enter the pan, through two holes, corresponding in position with those through the top of the hive: and round the holes are rims half an inch high. A square of glass forms a cover, extending as far as the partition, on which it rests at one side, and at the other on two little angular pieces in the corners. These, as well as the partition, are an eighth of an inch below the top of the pan. The means of seeing the bees is thus afforded without danger; and the glass is also useful on the removal of the pan. On this occasion a piece of thin sheet-tin must be pushed under it, taking care in so doing to avoid crushing any bees. The partition is strengthened in the centre by a stay, against which the glass rests, so as to retain it in its place.

When there is only one hole in the centre of the top of the hive (as is the more common case), I use a tin or zinc pan, seven or eight inches square, and one inch and a quarter deep, having a circular two-inch hole in the middle of the bottom, with a rim round it, standing up

half an inch. Another circular rim or partition, as large in diameter as the square of the pan



will admit, is soldered down within it at the four points where it touches the sides. It must not go down to the bottom, but a space should there be left of about an eighth of an inch, as a passage for the food, which is poured in at the four angles. A perforated thin wooden bottom or float is fitted loosely into the pan between the circles, under which, when slightly raised, the liquid flows. A cover is made by a piece of glass, resting on the larger circle, but cut nearly octagonal in form, so as to leave the corners open. The circle on which the glass rests should be an eighth of an inch lower than the outer rim.

I have sometimes heard objections made to the use of metal in any kind of bee apparatus,

as being too cold. But supposing there was anything important in this, the evil is remedied by the use of wooden bottoms.

A cover should be made to fit over the pans to prevent the access of robbers, and it ought to be high enough to receive the bell-glass, or glasses, for these are at all times best darkened. An additional advantage of pans on this construction will appear in winter, when we come to speak on the subject of condensation of moisture in the hives.

#### SITUATION OF AN APIARY, AND BEE PASTURAGE.

I agree with Mr. Payne in the following remark:—"I have no hesitation in saying that a south aspect is decidedly preferable to any other position for an apiary. I have tried various aspects, but the bees in the south I have always found to be the healthiest, and to collect the largest quantity of honey. It is very important that the hives should be sheltered from the wind by trees or houses, and that they are not placed in the vicinity of ponds or large rivers, for the high winds will dash them into the water, where numbers will perish."

Circumstances may interfere to prevent placing the bee stands in the exact position here recommended, in which case they may be

turned a few points east or west; but at all times a preference should be given to the former, for the afternoon sun ought to be avoided, if possible. Indeed it is a mistake to suppose that a hot sun is required to shine on bees. A little at the entrance of the hive in the morning is all that is desirable.

I prefer placing the bees on a grass-plot, the drier the better; and, if not otherwise well sheltered from the wind, planted with evergreens, particularly at the back and towards the south-west. Nothing high should be allowed immediately in front, nor towards the south-east; but a few shrubs, of no greater height than the alighting-boards of the hives, are rather an advantage as a resting-place to the bees on their return from work; for, from apparent fatigue, they frequently fall to the ground just on reaching home. All should be kept clean and well mowed around, and nothing offensive be permitted to remain in the vicinity.

When once fixed do not move your bees, the mischief of which I have often witnessed. I cannot enforce this recommendation better than Gelieu has done. "I have seen people," says he, "shift about their hives very inconsiderately; but change of place invariably weakens them, as the bees will return to their old resi-



dence, the environs of which are so familiar to them. A hive should remain as fixed to the spot as the ancient oaks, in the hollows of which they delight to establish themselves ; where they have their young, their companions, their beloved queen, and all their treasures. When the young bees take wing for the first time, they do it with great precaution, turning round and round, and fluttering about the entrance, to examine the hive well before taking flight. They do the same in returning, so that they may be easily distinguished, conducting themselves nearly after the same manner as the workers of a newly hived swarm. When they have made a few hundred excursions, they set off without examining the locality ; and returning in full flight will know their own hive in the midst of a hundred others. But if you change its place you perplex them, much the same as you would be if, during a short absence, some one lifted your house and placed it a mile off. The poor bees return loaded, and, seeking in vain for their habitation, either fall down and perish with fatigue, or throw themselves into the neighbouring hives, where they are speedily put to death. When hives are transported to a considerable distance, there is no fear that the bees will return. But this in-

convenience would be sure to take place, and many of them would perish, if they were removed only a few hundred paces from the spot they have been accustomed to. The hive may not perish, but it will be greatly weakened. In my opinion, if the situation is to be changed at all, they should be removed at least a mile and a half." This ought only to be done in winter.

*Bee Pasturage.*—Mr. Payne says, "I have always found the advantage of planting in the vicinity of my hives a large quantity of the common kinds of crocus, single blue hepaticas, *helleborus niger*, and *tussilago petasites*, all of which flower early, and are rich in honey and farina. *Salvia nemorosa*, (of Sir James Smith) which flowers very early in June, and lasts all the summer, is in an extraordinary manner sought after by the bees, and, when room is not an object, twenty or thirty square yards of it may be grown with advantage. *Origanum humile*, and *origanum rubescens*, (of Haworth) and mignonette may also be grown. Cultivation beyond this, expressly for bees, I believe answers very little purpose."

I should add to this catalogue, white alyssum for the spring, &c., borage for the later months. The neighbourhood of willows in the spring is of great advantage. After all, the certainty of

a large gathering of honey must depend on the nature of the surrounding country. The most highly cultivated districts are seldom so favourable to bees as those in which wild heaths, commons and woods prevail; or where white clover, saintfoin, buck-wheat, mustard, coleseed, turnip seed, &c., are produced in quantity.

#### STOCKING A HIVE, AND STRENGTH OF A COLONY.

To stock a hive, an early swarm should be selected; if possible in May. On this occasion, the holes at the top of it and elsewhere must be temporarily stopped till it is put up in its place. which must without fail be on the same evening. Should the swarm be immediately at hand, it is still better to place it at once where it is to remain; that is, as soon as the bees are pretty quiet, which will be in less than half an hour.

Unless the swarm is a very large one, and particularly if in a full-sized collateral hive, many persons think it is best to increase the numbers by uniting a second swarm to the first.\*

\* It is not always any easy matter to estimate the strength of a swarm. The bulk is not a certain criterion, as the weather causes the bees to cluster together more or less closely. Five thousand bees are estimated to weigh a pound; but this also varies, for on swarming they are always provident enough

It is clear that the stronger the colony is at the outset, the better the bees will work, and the more prosperous it will become.

The usual, and generally a certain method of uniting swarms is as follows. In a few days, or as soon as is desired, after the first has been established, a second swarm may be added to it. This must be hived in the usual way. On the same night, place a table in front of the one to which it is to be joined, over which spread a cloth. By a sudden and smart stroke the bees may be displaced from the hive, and will fall on the table in a lump. Take the first hived colony and place it over them, raising it a little at bottom; when the bees below will ascend and join it, forming one family. In moving the hive, let it be done with caution, for the combs, being at present new and brittle, are otherwise apt to fall down. It is seldom that any quarrel takes place if the business be done properly. Early the next morning move the hive back to its former position. One of the queens will be speedily be deposed, and all will go on quietly with double strength and activity.

to load themselves more or less with honey before their departure.

The swarm, however, ought to weigh nearly four pounds. Some have reached to six pounds, but this is rare.

I have tried with success, in a collateral hive, another mode of junction. On the 31st of May, 1835, I hived a swarm into the pavilion, and on the 7th of June a second one into an end box. To the latter a temporary entrance had been provided. The bees worked as two distinct families till the 19th of June, when each box was filled with combs. I then took out the dividers, and (borrowing a hint from Mr. Walond) substituted others of perforated zinc, through which the scent of both hives passed and mixed freely; for this greatly facilitates their union. In two days more these were withdrawn at night, and a junction made of the whole; the temporary entrance to the side box having previously been closed, as well as that of the pavilion. All were shut up till the next evening\*; on the succeeding morning they went to work in peace, with scarcely any loss of life, and on the 16th of July both boxes were filled with honey. But I think some doubt attaches

\* A difficulty sometimes occurs when it is necessary to confine bees, or drive them into the hive, as the alighting-board is often covered with them in an evening, and the numbers are increased on the least alarm. In this case take a small watering-pot, and gentle sprinkle the board and entrance, when the bees, mistaking this for rain, will all retire withinside.

to this mode of junction, and a well authenticated case came to my knowledge, where a supposed union of this kind was made after the two swarms had worked separately for three weeks. All went on peaceably at the time, but in the autumn, on endeavouring to remove the end box, it was discovered still to remain a distinct family, with its own queen, there being also one in the centre box. Both colonies had worked throughout the summer from one common doorway.

In whatever way bees are united, it should be done at night, and not when they are at work, or destruction would ensue. As a general rule it may be remarked, that the mode the most likely to succeed is that in which the bees are suddenly blended together, without space or opportunity for individual recognition or fighting, bee against bee ; and it must be done before the hive is filled with combs.

But though the methods of union now pointed out may answer at the proper time, they must not be resorted to at a later stage, or fatal consequences might result. A different course must then be taken, as will appear under the head of autumnal management.

## SUMMER MANAGEMENT.

We must now suppose the colony is fairly at work, and in fine weather. Should the reverse be the case, and bad days succeed each other immediately after swarming, and before any provision is accumulated, recourse must be had to feeding, or starvation might be feared. Under any circumstances, many apiarians advise giving honey, or a syrup of sugar and water, to a newly hived stock of bees; and this is a matter deserving more attention than it has received. It is well known, that on leaving the parent hive, the bees carry with them a good deal of honey. There is little doubt but that the main object in this provident proceeding is to enable them at once to commence the work of comb-building in the new dwelling; and this they do almost as soon as they are hived.

*Wax, and Combs.*—The material of which the combs are so curiously formed is wax *secreted by the bees* themselves, and not any substance conveyed into the hive, as is generally, but erroneously, supposed. “To see the wax-pockets in the hive-bee,” observe Kirby and Spence, “you must press the abdomen, so as to cause its distention; you will then find on each of the four intermediate ventral segments, sepa-



rated by the carina or elevated central part, two trapeziform whitish pockets, of a soft membranaceous texture; on these the laminae of wax are formed, in different states, more or less perceptible." To enable them to form this secretion, the bees must have access to some saccharine matter; (for a syrup of sugar has been found to answer the purpose as well as honey) and this is the first thing sought by a new colony, so that an early supply of it greatly facilitates proceedings. The common opinion is that the substance carried in so abundantly on the legs of bees is wax, and as such is the basis of the combs. Has it never appeared strange to the observer of a new swarm, that at the time when comb-building is proceeding more rapidly than at any other period, the bees are loaded with none of this substance? On the other hand, is it not equally clear, that, in the early spring, when few combs are constructed, they carry it into the hive with the utmost avidity? "Whenever combs are wanted," say Dr. Bevan, "bees fill their crops with honey; and retaining it in them, hang together in a cluster from the top of the hive, and remain apparently in a state of profound inactivity about twenty-four hours. During this time, the wax is secreted,

and may be seen in laminæ, under the abdominal scales, whence it is removed by the hind legs of the bee, and transferred to the fore legs; from them it is taken by the jaws, and after being masticated, the fabrication of comb commences."

*Propolis*.—To attach the combs firmly to the hive, the bees employ a fragrant substance called propolis, a resinous exudation from certain trees, which they collect immediately on swarming. With this material they varnish the cells, when filled; glue up all crevices, and cement down the hive to the floor-board.

*Honey*.—We have seen that the first want of the swarm is honey. This valuable article the bees collect from the nectaries of certain flowers, and receive it into their first stomach, from whence the greater portion is regurgitated into the cells of the combs. In some years it is most abundantly collected when in the state of what is termed *honey-dew*, a viscous substance found adhering to the leaves of particular trees, especially the oak. This only occurs in the most favourable honey years, for in others it is found very sparingly, or not at all.

Should the weather now be fine, the bees carry on their operations with astonishing per-

severance, and are too intent on what they are about to regard much anything else.\*

The entrance of the hive should now, (and

\* To the spectator the view of a newly-hived swarm is animated in the extreme, and the assiduity with which all pursue their allotted tasks, probably suggested to Dr. Aikin the

*Song of the Bees.*

We watch for the light of the morn to break,

And colour the grey eastern sky

With its blended hues of saffron and lake,

Then say to each other, "Awake, awake!

For our winter's honey is all to make,

And our bread for a long supply."

Then off we hie to the hill and the dell,

To the field, the wild wood and bower;

In the columbine's horn we love to dwell,

To dip in the lily with snow-white bell,

To search the balm in its odorous cell,

The thyme and the rosemary flower.

We seek for the bloom of the eglantine,

The lime, painted thistle, and brier;

And follow the course of the wandering vine,

Whether it trail on the earth supine,

Or round the aspiring tree-top twine,

And reach for a stage still higher.

As each for the good of the whole is bent,

And stores up its treasure for all,

We hope for an evening with hearts' content,

For the winter of life without lament

That summer is gone, with its hours mispent,

And the harvest is past recall!

at all times when the bees are at full work,) be opened to its whole extent, unless an attack from enemies takes place.

*Pollen, Farina, or Brood-bread.*—The hive will be rapidly filled with combs, and soon after with an increased population, for the queen immediately commences laying eggs, which as we have seen in page 4, are matured in three weeks. But before this takes place, the bees will have commenced a new labour,—that of collecting pollen or farina, as a stock of food for the rising progeny. This is the anther-dust of the stamina of flowers, varying in colour according to the source from whence it is derived. By a peculiar adaptation, the bees are enabled to brush this off, and roll it into the cavities, (or baskets as they have been termed,) furnished for this object, on the centre joint of their hind legs. The powder or meal, thus collected, is by other bees afterwards kneaded up into paste, and stored for use in the cells immediately adjoining those containing the brood. To preserve it from the air, a small portion of honey is put on the top of each cell, coated over with wax. Thus we find that the sole use of pollen or farina is (with a mixture of honey) for feeding the brood. It is often called *bee-bread*, but a more proper term

is *brood-bread*, for bees will starve in the midst of it; whilst, on the contrary, the brood will perish in a hive containing honey, but without farina.

*Ventilation.*—Now give more room and increased ventilation in hot weather to collateral hives, by placing the bell-glasses over the holes on the top of the pavilion.\* It is well, previously, to tie a piece of crape over the opening at the top of the glasses, to prevent egress in that quarter. The admission of light (at all times disagreeable to bees,) should be prevented; and for this purpose a box may be made to drop over the glasses, or a bag of cloth or leather might do. The bees will the sooner enter a glass, or top box, provided a small piece of comb is placed, in its natural position, within the opening from the under box. It should project an inch or two through, so as to be a guide to the bees. On this foundation they will work, continuing it upwards. If the bees soon enter the glasses, and begin carrying up the combs, their territory may be farther extended by opening an end box. They will take possession of this the more readily, if a

\* The glasses I prefer are about five inches in diameter at the bottom, and six inches high; and there must be a small hole at the top for ventilation.

little honey be previously rubbed inside, and the ventilators be closed. Be still more careful to let the bees have additional room, should a succession of honey-dews be perceived, for then they are doubly active.

*Temperature.*—Next commence an examination of the thermometer. As the heat rises in the side box, open the ventilator, and, when required, replace the tube with a clean one. From observation I am inclined to think that the most favourable degrees of warmth for the prosperity of the brood, and the comfortable working of the bees, are  $75^{\circ}$  to  $90^{\circ}$  in the pavilion, and  $65^{\circ}$  to  $75^{\circ}$  in the side boxes.\* As a general rule, therefore, I do not open the ventilators with the thermometer under  $90^{\circ}$ , in the pavilion, or  $70^{\circ}$  in a side box. I have rarely seen the thermometer higher than  $95^{\circ}$ ; and I have known swarming take place at considerably less than this. At a temperature between  $95^{\circ}$  and  $100^{\circ}$ , the combs soften so

\* The exact degree of warmth requisite for the construction of the combs has been the subject of controversy. The bees will certainly make them in a lower apparent temperature than is here stated, as is the case when they place them, from necessity, in the open air; but the additional warmth is probably generated by the practice of clustering about them in a mass during the process. It is evidently, therefore, not desirable to lower the temperature too much.

much as to be in danger of falling. As a precaution against too sudden changes, which are injurious to the eggs and brood, it is well, at this time, to avoid a direct current of air through the pavilion; the ventilators of the side boxes will usually accomplish all that is requisite, as in these I have sometimes found that the removal of the cap, or the insertion of a clean tube, has in a few minutes caused a diminution of 10 or 15 degrees of heat, to the evident comfort and better working of the bees.

*Water.*—At certain periods, but chiefly in the breeding time, and in dry hot weather, bees require a supply of water; and, if no pond or brook is near, it must be placed at no great distance from them. A large shallow vessel filled to the brim will do, having a piece of thin perforated wood floating on and covering the whole of it; or troughs may be made of wood and filled with moss, or pebbles, pouring in water to the top.

*Shade.*—It has already been observed that bees ought not to be exposed too much to the mid-day and afternoon sun in the hot months. Though a south aspect is recommended, it does not follow that they thrive the better for inconvenient heat. On the contrary, in the words of Gelieu, “they delight best in thick forests,



because they there find a uniform temperature and a propitious shade. It is a mistake to suppose that bees exposed to the sun produce the earliest and strongest swarms: I have often experienced the reverse." I always find it well to give the additional comfort of a mat, or something of the kind, as a shade in sultry weather. Independently of its advantage to the bees, this preserves the boxes from warping, and the combs from melting.

*Moths, Wasps, and other Enemies.*—In the warm summer evenings bees are often much annoyed by the attacks of flies and moths, particularly the *Wax Moth*, or *Tinea Mellonella*. These are sometimes formidable foes, and their appearance at dusk on the alighting-board is the signal for a commotion. It is difficult to eject them if they obtain a footing in a hive, and they now and then cause its entire destruction. To prevent the ingress of these troublesome invaders, it is sometimes desirable for an hour or two in an evening to close the entrance, by placing before it a screen of gauze, wire-grating, or perforated zinc, to be removed at dark.

The nests of wasps ought to be destroyed: they are very annoying to bees towards the end of summer; and when this is perceived, the

nuisance must be met by contracting the entrance to the hive, when the passage is more readily defended. Indeed it is always well to do this as the working season draws to a close ; but care must be taken not to decrease too much the supply of air, if the weather is warm ; and for this reason the contraction is best made with a piece or pieces of perforated zinc.

Should an attack from strange bees take place, which sometimes occurs (the strong robbing the weak), the same mode of repelling the invaders must be resorted to as in the case of wasps. No time ought to be lost when this appears, for if allowed to continue a day or two, the ruin of the hive might be the consequence. The best defence, however, against this and most other evils, is strength in the colony. No security is equal to *numbers*.

Insects of all kinds, as earwigs, ants, spiders, &c., must be cleared away from about and beneath the stands. Cobwebs must not be permitted to remain, or numerous deaths would ensue to the bees from entanglement in them.

Poultry, and some kinds of birds are destroyers of bees, and many, that from weakness or other causes fall to the ground, become a sacrifice to them. In particular, that little marauder, the Blue Tomtit or Titmouse, will

sometimes even try to force an entrance into a hive in winter.

In proportion to the wealth of the colony is the determination of the bees to defend it; and their irascibility and vigilance are now greater than heretofore, the strongest stocks showing it the most. The work of the year being pretty well over, all their attention is turned towards home. They become more and more suspicious, and the less they are approached or annoyed the better; for they are slow to forget or forgive an injury. If attacked, the best plan is not to offer resistance, but to walk away and thrust your head into a neighbouring shrub or bush, when the enemy will in all probability retire.

#### AUTUMNAL MANAGEMENT.

Much of what has been said in the preceding section is equally applicable in practice to the later months.

It is possible, in a good honey district and season, particularly if honey-dews have been prevalent, that a box or extra hive may be taken the first autumn, and in this case it is called *virgin honey*; but previously examine the stock hive, which ought to contain an ample supply for the winter and early spring consumption.

After the main honey-gathering is over (which generally happens as soon as dry weather sets in, in July), and the young have pretty well quitted the breeding cells, the bees will often occupy themselves in removing some of the honey from the side boxes into the vacancy thus made in the pavilion. Before a box or glass is removed, care must be taken to see that the cells are stopped with wax, otherwise there would be a loss of honey, which would run out.

*To take a Box of Honey.*—The middle of a sunny day has generally been recommended as the best time to take off a box of honey, but some prefer doing it towards evening, as less likely to attract robbers. The communication from the centre or stock hive should be cut off, and the box lifted gently from its place, removing it to a little distance, and raising the bottom with a wedge of wood. If it stands on its own distinct floor-board, however, all should in that case be moved away together, being much more safe and convenient. The process is shortened where no unnecessary noise or disturbance is made, and no jarring or tapping of the box takes place; and particularly if it contain no brood-comb, for this they leave very reluctantly. If there is no queen bee in the box the silence that at first

prevailed will soon be exchanged for a murmuring hum, attended by a commotion among the bees; and they shortly after begin to fly quietly home, without attempting any attack; when you may brush them from the combs. Should the queen be present, however, a very different scene would ensue, and from the exasperation of the bees, it would be attended with much danger to approach them. In such a case, the box must be replaced in its former position, till some other day. Some persons prefer endeavouring to ascertain in which of the boxes is the queen, before removal. This is done by shutting off the communication, and opening the outer entrance to the box you wish to take. If the queen is not present, it will soon become apparent, by the confusion of the bees.

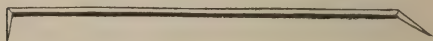
The combs may be readily separated from the sides of the box, and (by means of the top lateral opening) from the roof, with a large straight knife, or what is much better, a spatula. This is an article which will often be found useful, and the blade should be ten or eleven inches long. When possession of the treasure is obtained, the box may be returned to its place. Admit the bees into it, and they will

speedily clean it; or a part of the honey can be taken, and the rest restored to them.

The foregoing directions may be applied with little variation to any other hives managed on the depriving system. In the Nadir hive, the divider at the bottom should be pushed in, and the lower hole opened. When the doubling-board is in use, as described page 26, it will be necessary to slip under the hive you are about to take, a sheet of tin to shut off the communication below; also to push in the divider behind, to close the passage between the two hives. The extra hive being taken, the original one should be shifted back to the centre of the board, and this must be its winter position. Where the two separate boards are used, (see page 30,) on taking away the second hive, move the mouth of the parent one to the spot where the other stood, and the bees will be at no loss on returning.

A difficulty sometimes arises in extracting the combs from common hives or boxes, where there is no suitable opening. A large spatula will separate them from the sides, but to detach them from the top an instrument of a different kind is requisite. The one I prefer is simply a bar of steel about fourteen inches in total length, half an inch wide, and an eighth of an

inch thick. At one end it is bent at a right angle with the handle, and at the other at an angle of  $80^{\circ}$  or  $90^{\circ}$ . The part thus turned up is in both cases an inch and a half long, rather less than half an inch wide, and made spear-



pointed, or lancet shaped, sharpened on both sides, to cut either way. The one end is used when the top of the hive or box is flat, and the other, having a slight curve, is adapted to the form of a cottage hive.

*To take off a Glass of Honey.*—When the cells are all stopped with wax, detach the glass at the bottom by means of a strong knife or spatula; or, what is better, pass a piece of wire from side to side under it, to separate the combs from those below. Push underneath a piece of well flattened tin-plate, six inches square, to shut off the communication in that quarter. The tin is more convenient if one edge is a little turned up, as shewn on the top of my Improved White's Hive, at page 48. Cover the glass and remove it gently, without jarring, in the same position, to a short distance. Raise up the side, and the bees will



soon leave it. Some persons like to take away a glass an hour before sunset, or early in the morning, when few bees will be in it.

I may observe to the timid apiarian that he need be under little apprehension on taking away either a box or a glass of honey. The bees on these occasions, being separated from their queen, are commonly as much alarmed as he is, and are more anxious to escape home than to commence any attack.

*Autumnal Feeding.*—All labour is now suspended for the year, and what remains is to see that ample provision is laid up for the coming winter and spring. There ought to be at least twenty pounds of honey in the hive; but in the case of an old one, eight or ten pounds more must be allowed in estimating the weight; for old combs are much heavier than new ones, besides that they are a good deal filled with brood-bread. In a healthy stock there ought to be no scarcity of food, if the season has been tolerable. Gelieu says, speaking of his own country, (Switzerland), “in six years there are usually two bad, two good, and two middling seasons.” I think in our climate the proportion of good years is hardly so great as this. The worst however must be provided for; and if, from any cause, it should be necessary, recourse must

be had to supplying the deficiencies of nature. This should not be done later than September, or the very beginning of October, and the weather should be fine. My feeding pans and the mode of using them have been described at page 65. Food must never be given in the daytime, but about sunset, or a great commotion would take place, and the smell would attract wasps or strange bees; in which case a battle generally follows. To prevent the scent escaping from the pan, let a wooden box or cover be placed over it, as before described.

Nothing is so good for feeding at all times as pure honey, and, as at this season it is chiefly stored for future consumption, it is best unmixed with water, for this renders it rather more subject to candy, and consequently useless to the bees. Fill the pan again every evening, till the requisite quantity is given, for it will speedily be emptied. The sooner the feeding is ended the better, the bees, if in health, being on these occasions much excited and extremely irascible. Let enough be given when you are about it. Gelieu says, "let there be no higgling with bees; better that they have too much than too little." Recollect, that little or no part of your bounty is now eaten, but is conveyed and stored in the cells for the day of need; and I have

known the bees extend the combs at the time purposely to receive it, particularly when two stocks have been recently united. Nothing is wasted by these provident little animals, and whatever they have to spare will be repaid with interest in the spring. It must also be borne in mind, that what food is likely to be wanted must be supplied *now*, for on no account should the bees be fed in *winter*.

*Winter Store.*—It is important here to remark that the apparent quantity of honey required in winter is not dependent on the population of the colony. The number of mouths make little sensible difference, even if two or three stocks are united. This fact was first observed by Gelieu, and has been corroborated by the experiments of others.

“In doubling the population,” says Gelieu, “I naturally conceived that we must also double the quantity of food, for I had always seen that two or three families, living together, used more meat than each would have done singly, however rigid their economy. The more mouths the more meat, thought I; and, in consequence, I augmented greatly the amount of provision the first time that I doubled a hive; but to my great astonishment, when I weighed it again in the spring, I found that the united swarm had

not consumed more than each would have done singly. I could not believe my eyes, but thought there must be some mistake; nor could I be convinced until I had repeated the experiment a hundred times over, and had always the same result.”—“After this discovery, I varied my experiments, not only to convince myself of the fact, but, if possible, to arrive at more extended results. I joined three hives in the autumn, by introducing into the middle one the bees of two neighbouring hives; and I found, on weighing it in the spring, that its inhabitants had scarcely used one pound more than those of hives that had not been united. I went further. Having a large well-stocked and amply provided hive, I added to it, in the autumn, without displacing it, the swarms of four neighbouring hives, two on the right hand and two on the left, which were so scarce of provisions that the quantity of honey that would have been necessary to have kept them alive, would have far exceeded their value, and that all four would, to a certainty, have perished. This enormous population produced a heat so great, that, during the whole of a very severe winter, the bees kept up a buzzing noise equal to that of a strong and active hive in the evening of a fine day in spring. The hive was left out all the winter, and would infal-

libly have perished had I shut it up. What was my astonishment, on weighing it in the spring, to find that, notwithstanding it contained five families, the total diminution did not exceed three pounds more than took place in my ordinary hives! It gave out excellent swarms, long before any of the others, and recompensed me well for my pains."

This seeming anomaly has been attempted to be accounted for by Gelieu and others, on the principle that the increased heat of an augmented population is in some measure a substitute for food; but this is opposed to all experience, which proves that warmth is a stimulus to consumption. A more satisfactory way of disposing of the question seems to me to be simply on the ground of a larger supply of labourers in the very early spring. It is not in cold weather that the chief consumption of food takes place, but after the month of February, when the great hatching comes on; and then not by the *bees*, but by the *brood*. In a thinly-populated hive almost the whole of the bees are required within-doors at this time to warm and feed the young, and consequently little or nothing is added to the continually diminishing stock of honey and farina. This is not the case where a large proportion can be spared to go

abroad and bring in a fresh supply from the fields and gardens, to keep pace with, or even exceed, the demands of the rising brood. No greater proof than this need be adduced of the utility of uniting weak stocks in autumn, the practicability and extreme importance of which I can attest.

*Autumnal Unions, and the Transferring System.*—The subject of autumnal unions of bee stocks has hitherto not received all the attention which its importance demands. Perhaps this is in part owing to the ignorance of a ready mode of accomplishing the object, or of obtaining the necessary material; and in some degree from the supposed difficulty of maintaining the bees, when collected in a large body, through the winter. The latter obstacle is removed by a reference to what has been said, on the subject of winter-store, in the last paragraph. I hope I shall be able to show that, by a safe and simple expedient, weak stocks, joined two or three together, may be rendered strong and vigorous; at the same time that, by saving, instead of destroying, countless thousands of valuable lives, one great objection to the use of the cottager's common hives is obviated altogether. Hitherto, as respects these, the practice of suffocation with brimstone has

been almost the sole method resorted to for obtaining the honey ; and this act of ruin and murder is usually perpetrated in the autumn of the second or third year. The proprietor is probably not aware that the bees he is at this time sacrificing are always the most vigorous and useful. The old ones gradually disappear in the autumn, leaving the hive, no matter of what age, in possession of the bees bred chiefly, if not entirely, in the same year, and of the utmost value in the following spring. This fact is important, for the practice of suffocation has often been ignorantly defended on the plea of advanced age in the bees. The late Apiarian Society of Oxford is entitled to great credit for the attention it bestowed on this branch of bee economy ; and the method of procedure which I am about to explain was there successfully practised ; but it should be done in September, and in fine weather. The custom of stupefying bees by some narcotic substance has long been known in practice. By subjecting them to the fumes of this, they become insensible and harmless for a time ; but soon recover, with no ill effects subsequently.

The apparatus for fuming, as it was used at Oxford, is merely a tin tube, eighteen inches long, and three quarters of an inch in diameter ;



readily made by any tin worker, at little expense. One end is extended and flattened to adapt it to the entrance of the hive, whilst the other is applied to the mouth of the operator. In the centre of the tube is a box, two inches

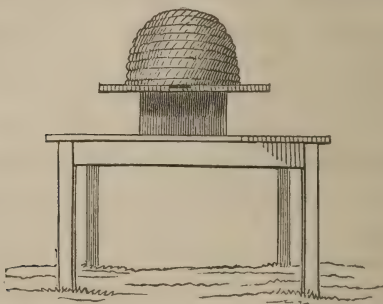


and a half long, and two inches in diameter, to contain the fumigating material ; and to receive which, one end is made to draw out like a telescope. At the two ends of the box, where the tubes join it, there are divisions of perforated tin. This part must be rivetted together, without solder, on account of the heat. The cost of such a tube ought not to be considered by cottagers, when its utility is so apparent ; and one of them would serve for half a parish.

The substance usually recommended for the fumigation or stupefying of bees is a kind of fungus, found growing often very large and round, chiefly in rich pastures, or plantations, in the autumn. It is the *Lycoperdon Giganteum*, but variously called, as Devil's snuff-box, fuzz-ball, or puff-ball. It should be gathered when nearly ripe. Dry it in the sun, or a cool oven,

and preserve it from damp. It is then a spongy substance, containing brown dust; and burns with an offensive smell. The difficulty often of procuring this material, led me to make trial of another kind of fungus, called, I believe, *Racodium Cellare*, or mouse-skin *Byssus*. It may be found growing in large wine or beer vaults, in immense dark-coloured bunches or festoons, suspended from the roof, often wearing a handsome appearance. In a single vault, in London, I have seen as much as would suffice for all the bee-keepers in Great Britain. It requires no drying, but ignites at once readily. From the experience I have had in its use, I can recommend it as even more efficacious than the other fungus. Whatever be the material employed, let the box of the tube be about two-thirds full; and if well lighted, the breath will cause it to send forth smoke abundantly. The hive which it is intended to deprive of its tenants must be lifted gently from its place soon after dusk, and placed over some kind of receptacle. An empty hive, turned bottom upwards, might answer with a little management, but there must be no place of escape for the bees. The best thing is a box or bowl, about ten inches square withinside, and five inches deep; with a flat rim all round of three or four inches wide. The first introduc-

tion of the smoke will cause an uproar among the bees, which will speedily be followed by



silence as they fall down from its effect. A minute or two generally suffices for this, assisted by striking the sides and top of the hive. When all is quiet, turn up the hive, and you will have received the greater part of its inhabitants in the bowl, in a stupefied state and perfectly subdued. A portion will remain sticking in the combs, which must be cut out one by one, and the bees swept with a feather into the bowl, where a little more smoke will, if needed, keep them quiet in the interim. As respects the queen, if perceived, as she generally may be, she may be taken away to prevent a quarrel, but the bees will commonly dispose of her in their own way, by the next morning. The whole being thus collected, they soon begin to show signs of

returning animation ; and when this is about to take place, sprinkle them pretty freely with a mixture of sugared ale. Next, lift quietly from its stand the hive to which they are to be united, placing it over the bowl, but leaving no opening except the mouth for ventilation. The bees from above, attracted by the scent, will speedily go down, and commence licking the sprinkled ones. The whole are soon intermixed, and ascend together into the hive over them, in perfect good-will. Leave them till the following morning early, when the bowl will be found empty, and not a life lost. Replace the doubled hive on its original stand, and the work is complete. If it is thought desirable still further to augment its strength, a second union may be made in the same way, a day or two afterwards. All that remains is to see that the hive contains honey enough to last the winter ; and whatever is wanted to make up about twenty pounds must be given for that purpose.

Having given the Oxford mode of fumigating and transferring bees, I will proceed to detail a still more simple method of doing the same thing ; and which I recommend in preference, as at once speedy and efficacious, and attended with not the smallest risk to the operator. With the tube of which we have before spoken,

in the evening fume, without disturbing it, the hive you wish to take. Tap it, and get as many of the bees to fall down as you can; then lift the hive, and brush out those remaining in the combs; taking away the queen if you can find her without much trouble. Collect the bees in a heap on the floor-board, and sprinkle them pretty well with sugared ale. Next puff, where it stands, some smoke within the stock hive into which the bees thus collected are to be transferred, sufficient to stupefy its inhabitants. Turn it bottom upwards, floor-board and all, so as to drop no bees, and place it, if of straw, in a pail, or some similar kind of support. In this position lift off the floor-board, and sprinkle these bees also with a little of the sugared ale, in the hive where they are. After this is done, with a feather, before they have recovered, sweep the first smoked bees uniformly among the combs of the second hive. Clean and scrape the floor-board of this, and replace it, turning the whole again into the right position. All that remains is to restore it to its original place or stand. The bees are now united, and not one need be lost. Before you leave the hive, it is always well to clear away from the entrance any bees that may have

fallen down, otherwise the passage for air is obstructed, which is very undesirable.

Whether the fumigated hive be new or old, poor or rich in honey, the plan of expulsion of the bees, just detailed, is applicable ; and that with quite as little trouble, expense, danger, or loss of time, as by suffocation with brimstone. The bees thus preserved in existence are a clear gain to the proprietor of so many able and willing labourers, eager to enrich him in the early spring ; and are merely transferred to other winter quarters, with no extra expense of feeding whatever. What can now be urged in extenuation of a wanton waste of valuable life ? The plea of necessity no longer avails as an excuse for what henceforth becomes an act of deliberate folly,—perhaps I might say wickedness,—that of killing bees. Why cannot the cottagers everywhere be instructed in the easy process last detailed of taking the honey, and saving their lives ? The difficulty of procuring the fumigating material is often urged as an objection, but from the sources which I have pointed out, enough may easily be had.

In every apiary there are always stocks to be improved by additional numbers ; and there is no difficulty in bringing a box or bowl of stupefied bees from a moderate distance, if de-

sired. In this case a sheet of perforated tin, zinc, or wood, may be placed over it, through which, if needed, a little tobacco-smoke may be applied.

In the absence of a tube like the one described, it is very practicable to make use of a common pipe and tobacco, but the latter should be of a mild kind, and not too freely used, or death might ensue. If more convenient, where there is a ventilating tube in the hive, or an opening at the top, a portion of smoke may readily be puffed down it. In a few seconds the hive will be filled, which is all that is requisite.

As far as it can be managed, it is desirable that attention should be paid to the previous position of the hives intended to form unions, for there is always a disposition in bees to return to the spot to which they have been accustomed. Where it is practicable, therefore, it is best to unite adjoining stocks; or when the union is to consist of three, unite to a hive in the centre one on each side. A little foresight, at the time of swarming, in the arrangement of the hives, will greatly facilitate after proceedings. Some have resorted to the plan of confinement, but this does not meet the difficulty, for, although shut up for months, on



the first opportunity the bees will return to their old haunts, and seek in vain their former dwelling.

#### WINTER MANAGEMENT.

When, as the cold weather sets in, the bees have collected together in one box, clustering there in a body, they must be no more disturbed. The dividers should now be pushed in, and preparation made for the coming winter. The mouth of the hive should gradually be contracted, as the cold increases. In one of my boxes an instance occurred where this was neglected; and the bees had in consequence sagaciously taken upon themselves, in the autumn, to contract the space. This was very skilfully done by building up a wall of propolis, with such regularity as only to leave at each end an entrance door-way of three quarters of an inch wide.

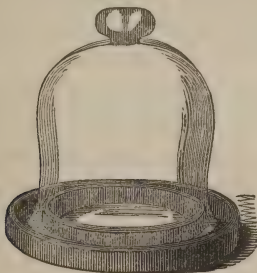
In the *Nadir hive*, it is best to shut off the communication with the under box, and confine the bees to the upper one, at this season.

*Moisture.*—Perhaps there is nothing more prejudicial to bees than the moisture engendered in the hive at this time, particularly after frost, and in certain states of the atmosphere. It accumulates on the top and sides of the box,

moulding and rendering offensive the combs, and producing disease. For this reason hives with flat roofs have sometimes been objected to ; and often justly, where no hole is made on the top. I have tried different experiments to obviate this evil, and have found nothing better than the practice of condensing the vapour as much as possible and conveying it away. This I have done for several years by means of the bell-glasses. At the beginning of winter, I place over the hole or holes on the top of the hive, a piece of perforated zinc or wood. Upon this I put one of the feeding pans, described at p. 65, from which the glass cover, and, if you please, the perforated bottom, are previously removed ; the hole in the pan being placed over the one below. This I cover with a bell-glass, standing within the pan. As the exhalation rises from the bees below, it is condensed on the glass, and received, often in considerable quantity, in the pan. An imperceptible current of air is thus produced, of great advantage to the inmates ; for ventilation is often wanted in winter as well as in summer, and particularly when the population is numerous. The holes at the top of the glasses may be left open to assist this, for of two evils it is better to have too much than too little air.

But there is nothing to fear from this, as a wooden cover over the pan is a sufficient protection, and it may now and then be removed to allow the escape of the impure air. In the absence of a bell-glass, the glass cover or lid to the pan may be kept in its place as a substitute, and a large portion of vapour will condense on this. We have already recommended the giving to all hives or boxes a slight inclination forwards, in placing them, as being useful in conveying away the moisture.

Where there is no feeding pan, the bell-glasses may be put within circular leaden or zinc troughs, having their centre open; and these of course placed over the holes below.



In the common hives, occasionally in winter, the impure air may be got rid of by means of a hole at the top, as I have already recom-

mended, placing over it a piece of perforated wood or zinc, and upon this some kind of cover, a little raised.

*Temperature.*—With good protection from weather, the effects of cold need not be apprehended, for the bees, if not weak in numbers, will always of themselves generate sufficient warmth; and a dry, cold season is better withstood than a mild, moist one, particularly after a good honey year. Indeed most of the casualties to bees in winter succeed unpropitious summers, or are occasioned by insufficient outer covering to the hives, nor presenting adequate protection against *sudden changes* of temperature, and particularly in wooden boxes.

It is certain that less food is consumed at a low temperature than a high one, and that the bees are healthy in proportion. I have known the thermometer down to or below  $32^{\circ}$  in the pavilion, with no bad effect to the bees when *clustered together*; but they would become torpid if exposed *singly* to this, or to a much less degree of cold, especially towards the close of winter; and could then only be recovered by artificial warmth.\* Added to

\* It is frequently the case in winter that a number of bees may be found, apparently dead, about a hive, particularly after sudden disturbance. The greater part of these are merely

this, I have seen honey perfectly candied in a hive from exposure to the frost: it is thenceforth useless as food.\*

Although a thermometer is useful, it is not always a criterion of the state of a hive at this season; for the warmth varies as the bees recede from it, and they very frequently shift their quarters entirely. When congregated immediately about the thermometer, I have known it rise as much as  $30^{\circ}$  on a frosty day, and an increase of temperature always follows any commotion in the dwelling.

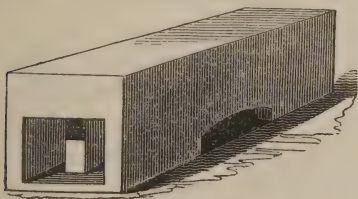
*Winter position.*—Nothing is more essential in winter than to keep off the influence of the sun from the front and mouth of the hive. Some apiarians recommend moving the hives from their summer stands to a north aspect.

paralysed by the change of temperature, and may be recovered by taking them to the fire. But this should be done with caution, for, if placed too near, the bees are not so likely permanently to recover, as when the restoration is gradual.

\* In two stocks which I had an opportunity of examining, at the end of February, 1838, after a very severe frost, I found cells filled with honey in a granulated state, and perfectly white. This was untouched by the bees, though distressed for food. Notwithstanding the unusual severity of the season, there were young bees in all stages of progression,—a proof that, at least, a high temperature is not essential to bring them to maturity.

There is a great objection (besides its inconvenience,) to this shifting of quarters; it involves the necessity of shutting up the bees close prisoners till the spring; for all that escaped would fly to the accustomed spot, never more to revisit home. I entirely agree with other apiarians, that bees are rarely very healthy where confinement has been systematically pursued, or when placed in close houses. "Who shuts up the wild bees in the forests of Lithuania, where they thrive so well?" asks Gelieu. Surely in this, as in other parts of our practice, we cannot do better than follow the guidance of nature. On a fine day, with the thermometer at or not much below  $50^{\circ}$ , (and these are not of unfrequent occurrence in winter,) the bees avail themselves of it, sallying forth in evident delight, with certain advantage to health and cleanliness; for they void nothing in the hive, unless compelled by long necessity. This is the point at which disease commences: indeed the retention of their fæces sometimes occasions death. Their impatience of confinement is excessive, and increases as the season advances, so that they will leave the hive at a lower temperature after Christmas than before. But in thus advocating the principle of liberty, I am not insensible to the evil it may bring

with it, if not guarded against. The most disastrous consequences follow the flight of bees on a cold day, when the gleams of a winter sun reach them, particularly with snow on the ground, the glare of which allures them out to destruction for they fall down to rise no more. The remedy for this is the darkening of the mouth of the hive, in such a way as to interpose a complete screen; and this should be done about the end of November, or as soon as winter actually sets in. To accomplish this object in my collateral Nutt's hive, I have constructed a winter mouth-piece, being a block of wood made to fit well into and to fill up the porch, behind the moveable arch-piece. The bottom part of this block is hollowed out into two wide openings, leaving a central parti-

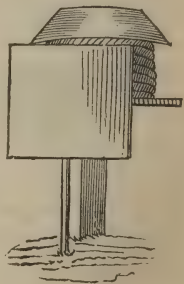


tion, with an oblong entrance in front, and a similar one behind, next the hive. To get to this, the bees must pass round the division,



right or left, the ends of which are cut away three-quarters of an inch to form a passage. The block is blackened inside, and is fitted with a bottom, so that no light can get above or under it; and as there is more than one angle through it, few or no rays can penetrate to the hive. At the same time it is important that it present no obstruction to the free passage of air, or dysentery in the hive would be the certain consequence. *An agreeable outward temperature* never fails to bring out the bees, with no risk whatever. The block answers the further purpose of preventing the ingress of any enemies, and is the best defence against driving wet or snow. The latter should be cleared away from about and in front of the stand, to prevent the chance of reflection, and for the better preservation from damp on thawing.

Where the construction of the hive does not admit of a guard of this kind, some means should be resorted to for preventing the access of the sun's rays to the hive. I have always seen the advantage of fixing before each a wooden screen, large enough



to cover the whole front, placed one or two feet in advance,—thus, in fact, making a north front.

*Cleaning Floor-boards.*—All who have been accustomed to the care of bees must have perceived the saving of labour to them, in the cleaning or changing of the floor-boards at the end of winter. This is not often attended to, owing to the trouble and risk of tearing up the hives to accomplish it; and, indeed, more harm than good is sometimes done. My boxes do not require this disturbance, from the facilities most of them afford in their construction for ready access without removal, by the large openings on each side at the bottom. Occasionally, on a fine genial day, the side boxes may be taken off, permitting the air to draw through, under the stock box, to carry off any damp and an impure atmosphere. The same facility is afforded in my Nadir hive by the side openings. All dirt may then be easily removed by means of a spatula, or a narrow iron or tin scraper, aided by a pair of bellows. Care should be taken to clear away any dead bees at the mouth, for these give great offence, and prevent the passage of air. In particular this should be done if signs of dysentery appear in the hive, which may be known by the dark-coloured evacuations, offen-

sive smell, and frequent deaths. This malady often attacks the strongest hives, particularly at the close of winter or in early spring, the most critical time for bees; and I am persuaded it is attributable to confinement in a damp impure atmosphere, with deficient covering and ventilation. As soon as the malady is apparent, no time should be lost in lifting the hive from its board, expelling the vitiated air, and scraping and washing away all filth and impurity; repeating the same process, if requisite, on some fine subsequent day. But the board should be dried before the hive is replaced on it; or where the case admits of it, a clean floor-board may be gently pushed under, with less annoyance to the bees. I have restored a stock to perfect health by thoroughly cleaning and ventilating it, after a third of the inhabitants had fallen a sacrifice. All remedies, as they are called, by feeding with different kinds of mixture, do much more harm than good. "Bees," says Gelieu, "have no real disease: dysentery, about which so much noise has been made, and for which so many remedies have been prescribed, never attacks the bees of a well-stocked hive that is left open at all seasons, but only those that are too long and too closely confined. They are always in good health as

long as they are at liberty ; when they are warm enough and have plenty of food. All their pretended diseases are the result of cold, hunger, or the infection produced by a too close and long confinement during the winter."

It only remains to say, that the more quiet and undisturbed bees are kept in winter the better, and the less disposed are they to consume food.

#### SPRING MANAGEMENT.

In February,\* or as soon as vegetation appears, the winter block and the screens from before the hives may be removed, and by degrees more space given at the mouth. Eggs will by this time be laid, which will require increased warmth to mature ; for it is not unusual, in a well-stocked hive, to see young bees in February. The troughs and bell-glasses should, therefore, be removed, stopping the holes where they stood, for which purpose nothing is better than the square tin described at page 90, placing upon it a leaden weight. On dry days, at this time, or in the two follow-

\* This is a good time to purchase bees for stocks, that have stood the winter, and have the appearance of being healthy and strong ; but they ought not to be moved later than the middle or end of the month.

ing months, the hives and boxes may be painted, particularly those of straw.

The bees will now, in fine weather, go forth in search of pollen, which they bring into the hive in large or even in useless quantity, so as sometimes to render it necessary afterwards to remove it; "and this," says Gelieu," is the only point on which they can be accused of a want of that prudence and foresight, so admirable in every other respect." This is the first thing required in the spring, and the eagerness of the bees to seek it is a certain indication of the presence of brood in the hive. At page 71 a list is given of early flowering plants, which it is desirable to have in the immediate vicinity of the hive. At this time the bees are weak, and incapable of a long flight: the weather too is unfavourable for it. Every facility should, therefore, be put in the way of their readily supplying their immediate wants at home. Afterwards they become very swift on the wing, and their flights to favourite pasturage will be extended probably several miles.

*Spring Feeding.*—It is well in a little time to examine the remaining stock of food, for a good deal will be required for the increasing numbers. If needed, some may be given, though in less quantity than in autumn: three

or four ounces of honey (made fluid, and stirred with a little warm water,) twice in a week are sufficient. In the absence of honey, in the spring, a substitute may be found in a pint of good sound ale, with a pound of sugar, boiled together for a few minutes and well skimmed. Some add to this a little wine or spirits, which at any rate is not displeasing to bees. At this season it is well to give the food on a fine day, and slightly warmed. Many persons recommend feeding even the strong stocks, for it is certain the bees are stimulated by the increased temperature to which it gives rise in the hive, and there can be no doubt of the importance of early breeding. But no feeding, unless from absolute necessity, should be resorted to till all chance of frost or snow is past; otherwise they are prematurely put in motion, and numbers perish, unable to reach home. It has before been recommended to cover the pan on using it; this especially is requisite in a cold spring, for then all means should be used to prevent the escape of warmth from the brood. As respects the bees, they may be more safely fed at the top of the hive than when compelled to go down for this purpose, where they are subjected to the effects of a chilling tempera-

ture. They ascend, however, unwillingly, till the weather becomes genial.

The entrance of the hive should be gradually opened, as the season advances and room is required; contracting it if any attack by robbers takes place, which sometimes occurs at this time.

*Enlargement of Hives.*—Should fine weather now ensue, the bees in collateral hives will soon require a side box. These should be taken off and cleaned, and the ventilators be everywhere closed for the present.

The common hives also require some attention; and where storifying is practised, a duplet will shortly be needed. Or, if a cap or glass is used, the bees will enter it sooner, provided a small piece of comb, projecting upwards through the opening, is placed as a guide, in the way detailed at page 81. The same observation applies to the Nadir hive, in which the bees may be admitted into the under box.

Should the weather be unfavourable for honey-gathering, after additional space has been given, some honey or syrup of sugar may advantageously be supplied, as in the case of a new swarm, to enable the bees to proceed with comb-building in their now enlarged territory.



As a general rule, it is well not to delay too long the giving of additional room, either by boxes or glasses. In reply to a correspondent who had complained of the difficulty he had experienced in preventing the issue of a swarm, Mr. Payne observes, "The reason in my opinion is, that the second small hive was not supplied soon enough, for the like has never in a single instance occurred with my own bees. I have not had a swarm these twenty years from any of the hives worked upon the depriving system. Occasionally I have compelled a hive to swarm, to fill up a vacancy in my number, where a queen has died, or some other accident destroyed the stock."

*Water and Shade.*—A supply of water at this time is requisite, if none is at hand; and a too powerful sun must be guarded against in the middle of the day.

*Temperature.*—As the month of May approaches, wealth rapidly accumulates; and the strong odour of the hive, and increased vigilance of the bees, attest the rising prosperity of the commonwealth. It now becomes necessary to pay attention to the thermometer in such hives as are not to be allowed to swarm, and this must be done from the beginning of May to the end of June, or sometimes a swarm may

rise even a little later than this. In particular this should be attended to if a hot sun intervene between showers, for a greater predisposition to swarming then exists than in dry weather. Those stocks should especially be observed that have swarmed in any previous year; for when this has once been permitted, there appears to be a tendency to a repetition of it. Should the heat of the stock hive suddenly rise to 90°, open the ventilator,—observing that the tubes are not stopped; for in every instance in which it was practicable to ascertain it, I have found that the swarms issued at a temperature varying from 90° to 95° of internal heat.\* If any young queens are cast out of the hive, or if the bees commence a vigorous attack on the drones, (which by this time may be seen in the middle of the day,) it pretty clearly indicates that no swarming is contemplated.

*Swarming.*—The usual period in which this takes place, is comprised in the months of May and June; though in extraordinary circumstances a swarm may issue somewhat earlier,

\* Some apiarians have named a considerable higher degree of heat as necessary to compel bees to leave their home, but this is an error; and I have proved by experiment that the combs collapse and fall at a temperature a little above 100°.

and occasionally a little later, than this. When it is expected, the hive should be watched from ten in the morning till two or three o'clock, after which time swarming rarely occurs.

It is not always easy to distinguish the appearances that precede a first (or *prime*) swarm, and experienced apiarians are sometimes deceived. The issue of a swarm is frequently to be expected when the bees have remained for some time previously in a state of apparent inaction; but mere clustering at the mouth of the hive is not invariably the precursor of a swarm; and they not unfrequently continue, as if from habit, to congregate in idleness on the outside, after abundant space has been afforded within. "In this case," says Dr. Bevan, "the cluster may be swept into an empty hive towards dusk, and carried to a short distance from the apiary, when they will gradually return, and, finding sufficient accommodation, generally join the family."

As far as hives managed on the depriving system are concerned, my own observation leads me to think that the worst honey seasons are those in which the greatest predisposition to swarming exists. In the busy time of a plentiful year the hive is deserted in the day by a great portion of its population; and thus the

same crowding and disagreeable heat are not experienced as take place when stress of weather or want of occupation confines the bees at home. The year 1838 (a very bad one) showed an instance of this, for stocks sent forth swarms that had never before done so. In despair of obtaining honey to fill them, the bees deserted the combs already in progress, and swarming was the consequence. In order to satisfy myself that poverty and idleness were the disposing causes of this proceeding in a collateral hive, I examined separately every comb, and found not an ounce of honey, though it was then the 21st of June.

*Returning of Swarms.*—In case of swarming, in a large-sized collateral hive, which, with tolerable attention in most seasons, may be prevented, it is best to return the swarm to the parent stock. This may be accomplished in different ways. Mr. Nutt, on such an emergency, says: “After the swarm has been taken in the usual way into an empty box, or straw hive, and suffered to settle therein a little, gently take the box or hive, and, having a tub of clean water placed conveniently, with a sudden jerk dislodge the bees, and immerse them in the water. Let them remain therein two or three minutes; then drain them off through a sieve,

or strainer, and spread the now harmless bees upon a dry cloth, and search for and secure the queen. This done, place a board or two in a slanting direction from the entrance of the parent hive to the ground. Upon this lay the cloth on which are the immersed bees, and spread them thinly over it. As they become dry they will return to their native hive, without any opposition from the bees already therein." On the same subject Mr. Payne observes: "Should the proprietor be unwilling to increase the number of his stocks, the swarm may be returned immediately to its parent hive; the process is very simple, and I have always found it succeed. As soon as the swarm is settled, turn the hive bottom upwards, and, if the queen-bee does not make her appearance in a few seconds, dash the bees out upon a cloth, or a gravel walk, and with a wine-glass she may be easily captured. Upon this the bees will return to their parent hive. The queen may also very easily be taken during the departure of a swarm, for she appears to leave the hive reluctantly, and may be seen running backwards and forwards upon the alighting-board before she takes wing."

In following the mode last detailed, I have found it advantageous, instead of a cloth, to

place on the ground four or five sheets of large paper. On these I have spread out the bees, and carried the sheets thus covered in opposite directions. Where there is no queen the bees will soon be in confusion, and fly home ; but in the reverse case, she may be discovered by the congregating in one particular part. This way of proceeding is in an especial manner convenient in the case of a *second* swarm, for then there are frequently three or four queens, and the operator must persevere till he has obtained possession of them all.

Circumstances however may occur where none of the plans here pointed out is available. In this event the swarm, if from a collateral hive, may be hived into one of the end boxes, and put up in its place at night ; shutting off all communication with the other box or pavilion, with the exception of the bottom opening, which must be left open. Take the cap off the ventilator, and puff down it two or three whiffs of tobacco smoke, when the greater part of the bees will fall in a lump to the floor. They will shortly recover, and will then make their way through the passage into the stock-box or pavilion, where no disturbance will occur. It is seldom the case that the queen will accompany them, for being surrounded thickly by her sub-

jects, she is the last to feel the effect of the smoke, and usually remains with a few bees behind. The next morning, about seven o'clock, push in the divider between the boxes, and remove the one containing the queen. Strike this pretty hard on a board or table, when, having dislodged the cluster of bees, the queen will immediately be perceived. Have ready a wine-glass to place over her, and when captured the remaining bees will return home.

No commotion in the parent hive would arise even were the queen of a *first* swarm to return to it. It has already been said that on this occasion the *old* queen invariably heads it. It is also an ascertained fact that she leaves no actual successor to the throne, but that an interregnum occurs of eight or nine days; the royal eggs being left short of maturity by this period, unless bad weather delay the issuing of the swarm. The first princess that is matured becomes the future mistress of the hive, for the law of primogeniture has been observed to be strictly followed. It is therefore evident that no disagreement can occur between rival queens till a *second* swarm rises. In such an event greater caution in this respect is necessary to prevent a quarrel, and no queen must then be permitted to re-enter the stock hive.



*Second Swarms.*—No precaution will at all times be effectual in preventing the issue of a second swarm (or *cast* as it is called,) unless so decided a change in the weather intervenes as to turn the attention of the bees to honey-gathering. At any rate they must be watched on the eighth or ninth day from that on which a first swarm rose. But the symptoms which precede the second issue are more unequivocal than those in the previous case. The young princesses are now arrived at maturity, and impatiently await the assistance of the bees in liberating them from the imprisonment of their cells; for, unlike the common bees and drones, they cannot accomplish this themselves. In the mean time they are supplied with food, and are heard to utter at intervals a plaintive kind of croak, which, for want of a more distinctive term, has been called *pip*ing. At its commencement a long note may be heard, gradually changing to a succession of shorter ones, and sufficiently loud to be heard at a distance of several feet from the hive. They appear to be in communication together; and their number may sometimes be ascertained by an attentive listener, particularly in the quiet of evening. In one of my own hives I distinctly discerned three voices, and this precise number of queens

I took from the swarm that issued on the following day. The piping sounds usually continue two or three evenings, but in any event they are the sure prognostic of a second swarm. "One certain meaning," says Keys, "they convey to the apiator, that when heard he may be assured that the first or prime swarm has escaped, if that will comfort him."

*Third Swarms.*—Some young queens may happen to come forth at a later stage; and then more piping is heard, and a third issue (or *colt*) results; though it has been maintained that no third swarm may be expected when more than one queen accompanies a second one.

It is not clear by what instinct bees are guided in after-swarms. Neither want of space nor superabundant heat are the impelling causes, for the original swarm sometimes leaves a hive comparatively depopulated. Whether driven out by the elder and now reigning sovereign, or prompted by instinct to seek intercourse in the open air with the drones, (which on these occasions are often very numerous,) it is certain that the young queens go abroad in a day or two after their release from the breeding cells, followed by so many bees as greatly to weaken the parent hive, if not returned to it. On these occasions they will even depart in weather that

would retard the issuing of an *old* queen. There seems also to be less of prudent foresight in second than in prime swarms, from the circumstance that more is left apparently to accident as regards the future place of abode. Where so much of prudence and seeming intelligence are discernible in all the proceedings of these wonderful insects, it is hardly to be expected that mere chance should direct on so important an occasion as the change of residence. A hive containing a few combs, placed in the season near an apiary, is almost certain to receive a swarm, which will sometimes fly to it at once, without any previous clustering. The instances are numerous of swarms proceeding a considerable distance to a place of refuge, carefully cleaned and prepared beforehand. I was an eye-witness to an example of this, where a prime swarm, taking a dislike to the hive in which it had been housed, soon after again issued ; and, mounting high in the air, flew in a direct line to the roof of a church a mile distant. But a *second* swarm has been known, in seeming perplexity, to commence comb-building in the bush on which it has alighted.

An absurd custom is very general of beating a pan, or something of the kind, on the occasion of bee-swarmling. The practice seems to

have originated in the precaution formerly observed of ringing a bell, or giving some signal of the flight of bees, with a view to an identification of the property in case of its straying to a distance. By degrees the idea became prevalent that the bees themselves were the parties interested in the clamour; but as regards them it is worse than useless, and frequently prevents their settling as soon as they would do if left quietly to themselves. The drenching of a hive, intended for a swarm, with any kind of mixture is another common practice much better avoided. A dry, clean hive is preferable. As respects the mode of hiving a swarm of bees, it is not necessary to say much. They usually alight and cluster on a bush, or branch of a tree, when they are easily shaken into a hive, put close under them. Turn the hive and bees in the proper position, a little raised on one side, and shade it from the sun.

I recommend an observance of the advice of Gelieu, and other experienced apiarians, not to allow the swarm to remain where it had been hived till the evening, but (if at hand) to place it at once, as soon as settled, in the spot it is destined to occupy. This will save many hives, as those persons know who have witnessed the return of bees, often in great numbers, to the

place where they had remained the day before, unconscious of the change of location in the mean time. When first hived, it is curious to observe the great caution with which bees mark the spot which they imagine is to be their future position, making circuits in the air, wider and wider, till they clearly understand the locality. Having done this, they are much perplexed at any subsequent removal of their dwelling.

*Union of Swarms.*—When it can possibly be avoided, I would never permit a second or third swarm to remain without returning it to the parent stock, or uniting it to some other. No good is to be expected from it otherwise, even if it could be preserved through the winter; whereas by the union a strong stock is secured, and double the honey collected, with no further trouble. The method of uniting bees in the swarming season is very simple, and has been detailed in page 72, and it ought to be done the same night. Should circumstances occur to prevent the union of the after-swarms at this time, it must be deferred till September, and the mode of proceeding then applicable is fully pointed out at page 96, under the head of *Autumnal management*. But it will be expedient to pay a little attention to the arrangement of the hives likely to form autumnal unions;

for the nearer these are placed together the better, the less to embarrass the bees. Should any particular stock be singled out as that which with probable advantage may be strengthened in the autumn, it will be well to range by its side, at the time of swarming, the hive intended to be joined to it. For the same reason, when a hive is destined to be emptied at the close of the season, let this be anticipated by placing as its next neighbour the stock to which its inhabitants are to be transferred, for I trust enough has been said of the folly, or rather wickedness, of *killing bees*.

#### INCREASE OF BEES.

On this subject much misconception prevails. Mr. Payne says,—“It is frequently asked, what becomes of the bees managed on the depriving system? If they are never suffered to swarm, nor are destroyed, the hive will never contain them. To which I reply, that it is well known to those conversant with the care of bees, that their numbers decrease greatly in autumn, not only by the murder of the drones, but also by the unavoidable deaths of many of the working-bees, owing to the thousand accidents they meet with in the fields. A much less space

is, therefore, wanted for them in winter than in summer."

The duration of life in common bees has been a disputed point; but were it extended beyond one year, a much larger accumulation of numbers in the hive than is now observable would be the result; for the quantity of eggs laid by a queen-bee during the year has been estimated at 60,000, and by some even more. I have no doubt, with Dr. Bevan, that every bee in a stock-hive after Christmas, was bred in the preceding summer.

Under a proper system of winter management, I think the number of deaths usually occurring during that season, may be considerably diminished by adequate covering, sufficient food, and occasional ventilation. But many causes operate to alter the ratio of increase in bees. Some queens are more prolific than others; situation has its effect, as well as the seasons. On the whole, I never saw any inconvenience arising from over-population, though the want of it is ruinous in the extreme; for comparatively little progress is made in the spring, without that degree of warmth obtainable only by the presence of numbers. Hence the necessity for at all times insuring these; and this is a strong argument in favour



of the plan already recommended for the union of bees in the autumn. It is certain that, however great may be the quantity of eggs laid by the queen, a very small portion come to maturity in any but a hive so well-peopled in the winter as to create a temperature favourable to the development of the early brood. Thus strength in one year begets it in succeeding ones; and this principle ought to be borne in mind by those who imagine that the deficient population of one season will be made up in the next, and that the loss of bees in the winter is of secondary consequence; forgetting how influential is their warmth to the earlier and increased productive powers of the queen, and how important it is in the opening spring to be able to spare from the home duties of the hive a number of collectors to add to the stores, which would otherwise not keep pace with the cravings of the rising generation.

#### BEE-DRESS.

It ought to be remarked that, in general, operations on bees should be conducted in the middle of the day, when a great portion are abroad; that being the time when it least annoys them, and the safest to the operator, for the bees on their return home are not dis-

posed to attack, but only those issuing from the hive. Make as little noise and disturbance as possible, and have at hand whatever is likely to be wanted. Let all things be done coolly, and without hurried motions, which cause suspicion and irritation. Avoid breathing on the bees; and above all things be careful to kill none, for the smell of the body exasperates them beyond measure. Another precaution may be mentioned, which is, in any operation on bees, not to employ a person known to be obnoxious to them; for without going the length of saying with some that certain individuals are recognised by them, it is well known that others are objects of very marked dislike.

Security from attack, however, is essential to self-possession, and no covering that I have seen is so effectual as a kind of light net, called *leno*. It should be made like a bag, to go over a hat or cap, with sleeves to tie at the wrists, and strings at the bottom to draw and fasten round the waist. The projection of the hat keeps it off the face, and it is sufficiently transparent. This and a thick pair of woollen gloves are all that is necessary to complete security.

## REMEDY FOR THE STING OF A BEE.

As a sting may, perhaps, at one time or other be received, I will subjoin Mr. Payne's remedy in his own words—one which I have tried with complete success: “I pull out the sting as soon as possible, and take a piece of iron and heat it; or, for want of that, a live coal, (if of wood, the better, because it lasts longer,) and hold it as near to the place as I can possibly endure it for five minutes. If from this application a sensation of heat should be occasioned, a little oil of turpentine or Goulard cerate must be applied.”

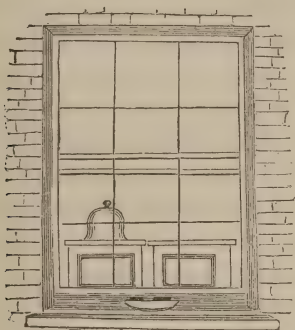
But another certain and more simple remedy consists in the immediate application of *liquor potassæ* to the spot, to neutralize the acid of the sting. It should be used in small quantity, on the point of a needle or fine-nibbed pen, introduced into the wound. In the absence of this, *pure liquid ammonia* is said on good authority to succeed, if properly applied. Keep it in a close-stopped, small-necked bottle, which should be turned bottom upwards, and held very tight over the part. But any remedy to be effectual, must be speedily resorted to; and particularly in summer, for

then the poison is much more active than in cold weather.

#### CONCLUSION.

I have in the foregoing pages given an outline of the experience I have myself had, aided by that derived from other sources, in the humane management of bees, on the depriving and transferring systems. To the possessor of ever so small a garden, a constant source of pleasing amusement and recreation, is afforded by these interesting insects, at a moderate outlay. But even this is not essentially requisite in keeping bees on a limited scale: I have known them thrive equally well in a quiet room of a dwelling-house or out-building; and many of the most useful experiments by Bonner and other apiarians have been made under these circumstances. The floorboards described at pages 21 and 26 are admirably adapted in such cases. These may be so fixed as to allow the bees a free communication outward, by some aperture, or through a window, but with no passage elsewhere. Very little either of preparation or expense is required; and in no other way can they be kept with greater security, or with more convenience and safety of access. The following engraving

show a doubling-board, with its two boxes, as placed at one of my own upper windows. The board fits within the frame of the window,



which is merely raised sufficiently to permit of its being projected under the lower edge. A shade or blind is required in hot weather; and on the removal of a full box, all that is necessary is to take it to a neighbouring open window, when the bees will return home.

Where proper care has been taken of them, I have seldom known a person who willingly discontinued the keeping of bees; but failure is often occasioned by wilful neglect, and an adherence to vulgar prejudice; or, perhaps, it is attributable to bad situation, or an unfavourable honey

locality. The latter has much to do with the system proper to be adopted ; and especially as regards large collateral hives, which are far from suitable to every neighbourhood. Particular seasons also have great influence, and the treatment of bees must vary with them, as a little experience (aided by a journal of proceedings) will demonstrate ; for the same experiment tried in different years and situations will frequently produce opposite results.

Nor ought those whose station in life enables them to avail themselves of improvements, and to communicate knowledge, to overlook the claims of their less fortunate neighbours for advice and assistance in the management of their bees. To the latter, in particular, it is essential to receive such friendly offices as will enable them to turn their time and attention to a good account. This class of persons might be furnished with the tube, page 98, and shown by example the simple process there detailed, by which in autumn the honey is at once obtained from the cottager's hive, at the same time that the labourers it contained are transferred to other stocks, as a future source of usefulness and profit.

Respecting the durability of a colony of bees, I am inclined to think, that in no other way

is it so likely to be certain as in well-managed depriving hives. I am not speaking of the bees themselves, for they are undoubtedly reproduced annually. There seems no reason to doubt that, barring casualties, the decay of the dwelling is the only limit to the duration of a bee settlement. Gelieu had them for twenty-five years; though in this time the combs had been renewed, by periodically cutting out the oldest of them in succession, the vacancies thus made being soon supplied by the bees. Some have assigned a period of six or seven years as that in which all the combs should be thus removed, but I think this is too long. It should be done sparingly at a time, and early in the spring. After a while, there is no doubt the old combs are contracted by use, become black, filled with an accumulation of brood-bread, and are less favourable to the intended design than at first. After all, the use of certain hives or boxes obviates the difficulty; such, for instance, as Dr. Bevan's bar hives; or still better, my White's boxes. But I have seen a stock in perfect health of fifteen years' standing, where, as I was informed, little or no pruning of the combs had been resorted to. It had never swarmed, and the weight of honey taken from it was stated to have frequently been forty-five



pounds. This is less than may sometimes be calculated on in a good bee district for a collateral hive, well managed, from which I once knew ninety pounds taken in a favourable season, leaving abundance of winter store.

In thus recommending to the proprietor the most humane and interesting modes of bee cultivation, I have confined myself chiefly to matters of *practice* ; and consequently some of the remarks made, and directions given, are necessarily a repetition of what has been said by others. Novelty is of infinitely less consequence than utility, and a summary view of what experience has proved to me to be founded in right principles. My attention has been chiefly directed to improvements in the apparatus of bee-keeping, for the purpose of greater simplicity, and easier management ; and if some of the details of construction I have given appear tedious, it must be borne in mind that they are addressed rather to the mechanic than to the amateur apiarian. To the latter I should, however, say, that throughout, I have kept him especially in view ; and if I have succeeded in smoothing his way, by the removal of a single difficulty, my object is fully answered.

Those who wish to enter at greater length into the question of the internal œconomy and

general physiology of bees, may consult a variety of works, at the head of which I should place that of Huber, before referred to. That portion of the subject relating to the structure and arrangement of their combs and cells, is treated of at considerable length by Lord Brougham in his "Dissertations on Subjects of Science connected with Natural Theology." Perhaps the accurate observations and elaborate mathematical demonstrations of the noble author, have left little more to be desired in the particular department to which he has devoted the energies of his powerful mind. But our knowledge is still limited in other branches of the natural history of bees. "The attention," says Lord Brougham\*, "which has been paid at various times to the structure and habits of the bee, is one of the most remarkable circumstances in the history of science. The ancients studied it with unusual minuteness, although being, generally speaking, indifferent observers of fact, they made but little progress in discovering the singular œconomy of this insect. Of the observations of Aristomachus, who spent sixty years, it is said, in studying the subject, we know nothing, nor of those which were

\* Vol. i. p. 333-336.

made by Philissus, who passed his life in the woods for the purpose of examining this insect's habits ; but Pliny informs us that both of them wrote works upon it. Aristotle's three chapters on bees and wasps\* contain little more than the ordinary observations, mixed up with an unusual portion of vulgar and even gross errors. How much he attended to the subject is, however, manifest from the extent of the first of these chapters, which is of great length. Some mathematical writers, particularly Pappus, studied the form of the cells, and established one or two of the fundamental propositions respecting the œconomy of labour and wax resulting from the plan of the structure. The application of modern naturalists to the inquiry is to be dated from the beginning of the eighteenth century, when Maraldi examined it with his accustomed care ; and Reaumur afterwards, as we have seen, carried his investigations much further. The interest of the subject seemed to increase with the progress made in these inquiries ; and about the year 1765 a society was formed at Little Bautzen, in Upper Lusatia, whose sole object was the study of bees. It was formed under the patronage of the Elector of

\* Hist. An., lib. ix. cap. 40, 41, 42.

Saxony. The celebrated Schirach was one of its original members ; and soon after its establishment he made his famous discovery of the power which the bees have to supply the loss of their queen, by forming a large cell out of three common ones, and feeding the grub of a worker upon royal jelly ; a discovery so startling to naturalists, that Bonnet, in 1769, earnestly urged the Society not to lower its credit by countenancing such a wild error, which he regarded as repugnant to all we know of the habits of insects ; admitting, however, that he should not be so incredulous of any observations tending to prove the propagation of the race of the queen-bee without any co-operation of a male,\* a notion since shown by Huber to be wholly chimerical. In 1771 a second institution, with the same limited object, was founded at Lauter, under the Elector Palatine's patronage, and of this Riem, scarcely less known in this branch of science than Schirach, was a member.

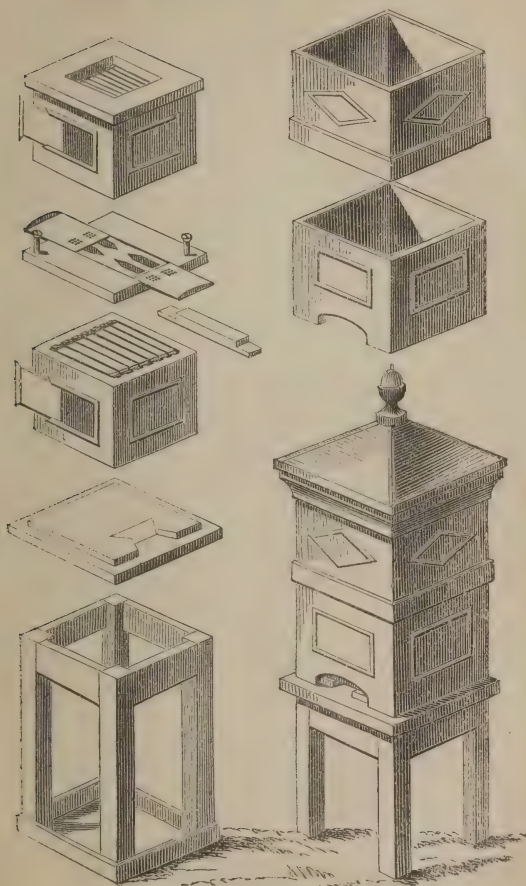
“The greatest progress, however, was afterwards made by Huber, whose discoveries, especially of the queen-bee's mode of impregnation, the slaughter of the drones or males, and the mode of working, have justly gained

\* Œuvres, x. 100, 104.

him a very high place among naturalists. Nor are his discoveries of the secretion of wax from saccharine matter, the nature of propolis, and the preparation of wax for building, to be reckoned less important. To these truths the way had been led by John Hunter, whose vigorous and original genius never was directed to the cultivation of any subject without reaping a harvest of discovery. Since the time of Hunter and Huber, no progress has been made in this branch of knowledge."

In conclusion, whatever may be the degree of darkness in which on some minor points respecting the Honey-bee we are still involved, there are few but may receive instruction and example from these wonderful little creatures, in the duties of persevering industry, prudence, economy, and peaceful subordination; whilst all may be taught by their perfect organization a lesson of humility, and by the contemplation of their beautiful works "to look from Nature up to NATURE'S GOD."

## THE AMATEUR'S BAR-HIVE.



## APPENDIX.

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SINCE the publication of the *Third Edition* of the BEE-KEEPER'S MANUAL, I have frequently been asked for a description of my improved *Amateur's Bar-Hive*, of which an engraving in detail is given in the preceding page. An arrangement by which each comb should be individually available, whether for separate extraction, or for experimental purposes, has always been a desideratum with apiarians. Among the advocates for what may be termed the *Bar system*, stand preeminent the names of Dr. Bevan and Mr. Golding. To the intelligence and perseverance of the latter we are particularly indebted for having been instrumental in reducing to fixed rules what had previously been undefined and uncertain. Still, among the majority of amateur bee-keepers, the requisite tact and disposition have hitherto been wanting to apply in practice what is allowed to be excellent in theory. Under the conviction that it was possible to render the storified bar principle of easy and safe management, the hive we now are about to describe was constructed, combining, as I think it does, all that is essential to utility and convenience, without an undue expenditure.

The Amateur's Bar-Hive consists of a pair of boxes; the lower one being the *stock-hive*, or usual residence of the family, and breeding place of the Queen or Mother-Bee, and which need rarely be disturbed. The other is for the purpose of affording the bees occasional additional storing room, and is termed the *super-hive*, its place being over the other.



The boxes are of one inch wood,  $11\frac{3}{4}$  inches square withinside. The stock-hive is in inside height, *including the bars*,  $8\frac{1}{2}$  inches. Making deduction for the bars, these dimensions give a shallow hive, the form I think the best adapted for the well-doing and health of the bees. As regards the mode of constructing the windows, sliding zinc shutters, &c., reference may be had to pages 16 and 17. The glass in the windows should be so fixed as to leave as little recess as possible inside the box, otherwise the extraction of the combs is much impeded. Both boxes are furnished with seven moveable bars,  $1\frac{1}{8}$  inch wide, and  $\frac{3}{4}$  inch thick; fitted rather loosely into shallow recesses cut from the upper inner edge of the box. The interspaces between the bars will be about half an inch. Mr. Golding says, "a slight inclination to approach nearer may be given to the centre bars, while the exterior ones may be allowed what is thus afforded them. This slight variation is intended to suit the breeding width of the combs in the centre of the hive, and to allow somewhat for the elongation of the *honey* cells towards the exterior." It is evident that in the use of bars the Bees are more constrained in their building operations, than where they are free to follow their own inclinations as to the position and mode of communication from comb to comb. I have endeavoured to meet this dilemma, and to provide the family with a passage from one part of the hive to another, in some degree analogous to their own notions of convenience. For the space of two inches, at each extremity of the upper side of the bars, they are cut out horizontally through half their thickness. In this way a gallery is formed all around the upper part of the dwelling, of great utility, not only as a means of equal ventilation and temperature, but as

offering facility in the removal of the bars. A cover nearly an inch thick, clamped at the ends, and projecting on all sides half an inch, is fixed down close over the bars with two or three long screws. The latter should be greased to facilitate their subsequent extraction. Our Engraving shows the cover lifted above its box, in order to exemplify the arrangements thus described. An important feature remains to be mentioned. In most hives of this kind it is the practice, when a super is required, to substitute for the usual top what is termed an *Adapting board*, through which are cut the holes of communication from below; and this, in its turn, has to be removed again to make way for the other.

It is not always that amateur Apirians, even though they may be enveloped in clouds of tobacco smoke, are possessed of the nerve requisite to perform, periodically, the operation of changing the cover immediately over an overflowing stock-hive. My plan renders it unnecessary. A groove of about an eighth of an inch deep, and  $5\frac{1}{4}$  inches wide, is recessed out of the cover, running in the same direction as the bars; within the part so sunk four holes,  $3\frac{1}{4}$  inches long, and half an inch wide, are cut through, laterally, two at each end; their position being on the two sides of the centre bar. These two sets of openings must be so situated as to leave a clear space in the centre of the cover of  $2\frac{1}{2}$  inches; and they form the communication between the lower and upper box. To stop this, when required, two slides or dividers are introduced into the recess, one at each end; these are made of strong, well-flattened zinc. The dividers are  $6\frac{1}{2}$  inches long, and an eighth of an inch less in width than the recess, to work easily; their outer extremity is a little turned upwards for convenience. When in their places the dividers

will meet in the centre, their turned-up edges coming in contact with the super-box. They will work better if confined, and in some way guided in their place ; for this I found nothing answer more completely than two or three common brass nails, with semi-circular projecting heads, inserted along the line of the edges of the groove. To obviate danger to the bees in the passing of the dividers, the lateral openings already described are cut nearly to a point at their inner extremities. For the purpose of occasional ventilation, the dividers are partially pierced with small holes, so made that, by drawing one or both out half an inch, or a little more, the perforations are moved over the openings beneath. This degree of ventilation is sufficient for all useful purposes, and is chiefly required occasionally during the winter confinement of the Bees, in mild damp weather, when an injurious accumulation of moist and impure air frequently fills the hive, and ought to have the means of escape. This provision obviates the objection often raised against hives with flat wooden roofs. The super-box should, in height, be an inch *lower* than the under one. In other respects they are alike, with the exception of its cover : in thickness and size this is similar to the top of the stock-box ; but it must be made as a square frame, two inches wide. The lower inner edge of the frame should be so rabbeted as to receive a square of thick and flat glass, which must be fixed therein, with white-lead or cement, *flush with the frame*. The whole is screwed down upon the bars, as in the other box, and in this way are provided the means of occasional interesting observation of the operations going on withinside. At other times, however, the admission of light should be carefully guarded against, by some kind of covering over the top.

The floor-board is made on the plan described and shown at page 20. It should be fully  $1\frac{1}{4}$  inch thick, 18 inches square, a rabbet being made on all its sides,  $1\frac{3}{4}$  inch wide, and  $\frac{3}{8}$  inch in depth. The door-way is cut in the raised part of the board, five inches wide, so formed as to receive the mouth-pieces shown at pages 19 and 20, and where directions for their use are given. On each side of the door-way is cut a small groove, for the purpose of conveying away the moisture that sometimes is generated in a hive.

As far as we have proceeded, where there is a roomy suitable bee-house, the boxes and floor-board thus described may be placed within it. For my own part, I object much to the common bee-houses, usually receptacles of dirt and insects, and at all times extremely inconvenient to operate in. Well protected hives, complete and independent of themselves, and separately approachable all round, are preferable, and more conducive to the health of the bees. To complete the design of these hives, therefore, an outer covering is provided; for no wooden boxes, however thick, ought to be exposed to the action of the sun and weather. The cover is made in two compartments or cases, and a roof, impervious to wet or light. The cases are of half-inch wood, and 16 inches square on the outside. The underneath one is nine inches high, dropping loosely over the stock-box on to the rabbeted part of the floor-board. A good-sized opening is cut at the bottom, fronting the mouth of the hive. The upper case is  $8\frac{1}{2}$  inches high, exclusive of its projecting band, or fillet; the fillet is about  $1\frac{1}{2}$  inch wide, and  $\frac{3}{8}$  of an inch thick, attached half its width to the outer lower edge of the case. The other half-width of the fillet overlaps the top of the under case, and should be chamfered, so as to work easily. A reference to our

engraving will exemplify the roof, underneath the four projecting edges of which is a suspended cornice, two inches deep on its outer side. When in its place, about three quarters of an inch of the cornice ought to overhang the case, rather loosely; to regulate this, recessed at the four angles, within the cover, are attached cross corner blocks, and these rest on the hive. The cover fits equally well below, so that, when not in use, the upper box and case may be removed, and the edifice reduced to one story. For the purpose of ventilation, lateral openings, four inches long and a quarter of an inch high, are cut out from the upper part of the cornice, in the centre, immediately under the four projecting edges of the roof. The projection of the latter should be an inch more than that of the floor-board.

The stand for the whole is simply an open frame, of the same outside dimensions as the cases; with inch-thick rails, four inches deep, framed at the corners to four posts or legs. These may be two inches square and two feet high. The floor-board drops loosely down into the frame, resting on the rails, and showing a projection all round of an inch. It will there be kept steady by the cross-bars on its underneath side. For those who desire the convenience of a small drawer, there is room for one in the back frame of the stand. In placing the boxes on the floor-board, it should be so that the bars range in a direction from front to back, the window being behind.

It may not be amiss to point out to the artificer the expediency, both in the boxes and covers, of working the wood so that the grain should run in one and the same direction—horizontally. The expansion and contraction, constantly following the changes of season and weather, will then be ren-

dered of no practical importance. As respects the details of exterior embellishment, all that is requisite will, probably, suggest itself by a reference to our Engraving. The whole ought to be well painted, except such parts as come withinside the boxes. I wish to point out the great desirableness of adhering to the details as to dimensions, &c., I have thus given, so that the exact standard of size and measurement may prevail in every hive. It is important that bars and every other appurtenance should fit equally well, however shifted about.

As regards position in a garden, nothing is better than a dry, well-screened grass-plot, with a southern aspect.

In the swarming season, the lower box must be stocked by hiving a family of bees into it in the usual manner.\* On this occasion the dividers on its cover should be temporarily made fast in their places; previously, however, it will be necessary to attach what are termed *guide-combs* to two or three of the bars. The object in view is to furnish foundations on which the bees will continue their works, without placing the combs across the bars, as they

\* I may here not inappropriately call the attention of the apiarian to a subject hitherto touched upon, so far as I am aware, only by Mr. Golding. His remarks are borne out by my own observation; and I believe it would be for mutual benefit were bee-keepers, resident a few miles apart, occasionally to exchange swarms in the season. I make no apology for introducing a passage from Mr. Golding's excellent *Shilling Bee-book*. "Though I can give no satisfactory reasons for the fact, yet it certainly is one, that bees brought from a distance very generally thrive better than families long domiciled on the spot. I am borne out in this opinion by the concurrent testimony of my apiarian friends. Whether they ply more vigorously on finding themselves in a strange situation, or what can be the reason, I leave others to guess at."



might otherwise choose to do. In other words, they must be constrained to build in straight lines, one comb not being attached to another, which would render their subsequent extraction difficult or impossible. In giving the requisite directions, we cannot do better than use the words of Mr. Golding: "Pieces of clean *worker-comb* should be reserved for guide-combs (or decoys for glasses). Upon each of the side-bars, nearest the centre one, a small piece of comb should be fixed. This is easily effected by heating a common flat-iron, slightly warming the bars with it, then melting a little bees-wax upon it. The comb is now drawn quickly across the heated iron, and held down upon the bar, to which it firmly adheres, if properly managed. These pieces of guide-comb need not be more than two or three inches in diameter. Care should be taken that the pitch or inclination of the cells is upwards from the centre of each comb." *Drone-celled combs* for this purpose are to be avoided, as well as those with *elongated* cells.

Do not permit the bees, in either box, to commence making combs *upwards* from the floor-board, which they will sometimes attempt. When this is the case they should at once be scraped off. The mouth of the hive ought to be entirely left open when the bees are at full work.

The proper time for giving additional room to the bees must be a matter of judgment, depending, in part, on weather and season. An early swarm will often require a super in a few weeks, previously allowing the first hive to be pretty well filled, as otherwise there is a disposition in bees to carry their stores upwards, at the expense of the stock-hive, where there should not be less than eighteen or twenty pounds of honey for the winter supply. To



ascertain this, the weight of the floor-board, and boxes, respectively, should be marked upon each previously to use. The state of the stock-hive must be examined in the spring, as to crowding, and an increased heat of the window glasses, when timely admission to extra storing-room is advisable. The super-hive must be prepared with guide-combs, in the way we have already described, and placed over the other. Withdraw the dividers, and the bees will ascend into it, and perhaps the more readily if a little honey is smeared on the guide-combs. Those who choose may substitute bell-glasses for the super-hive; in which case two of five inches, outer diameter, can be placed over the openings; or a single glass, of ten or eleven inches, might be used. The dividers will now be out of use, and the recess they had occupied hitherto can be turned to an extremely beneficial account, as a means for supplying ventilation to the super standing across it. For this end the space should be kept clear.

When it is desired to obtain possession of the combs from the super-hive, (which should not be till they are pretty well sealed up,) in the middle of the day the dividers must be pushed under it, into their places. Do this gently to avoid injury to the bees. The communication being thus cut off from below, the super may be wedged up a little on one side where it stands. The bees will probably soon show signs of a desire to escape, unless indeed it should turn out that the Queen-bee is therein, (not often the case). In such event, the tumult would most likely be perceptible in the stock-box. An emergency of this kind must be met by restoring matters to their previous state, and again withdrawing the slides for another trial a few days later. If, however, all is right, the super may be at once removed to a shady

place, a little distant, and placed on a couple of cross sticks. Unscrew and remove the top, when, if the box contain no brood-combs, the bees will speedily escape upwards and fly home. The stragglers may be brushed out between the bars with a feather or twig, and not a life need be lost. Possession can now be had of as many of the loaded bars as you may choose to remove, taking care that your partners in the concern are well provided with family store for the winter. In case of need, or of doubt, a comb or two had better be left for an emergency in the spring, which might perhaps then save the trouble of feeding. The bars may be replaced, or spare ones inserted in the super, into which the bees can again be admitted, time and season permitting, and fresh work commenced. The family, however, must be confined to the stock-hive during the winter. On removing the combs from the bars, the latter should not be scraped clean, but a row or two of cells may, with utility, be left attached. This is always agreeable to the bees, and saves future trouble in the fixing of guide-combs. Nothing is easier or safer in operation than the process of deprivation we have thus described, and it may be repeated at any time. In no other description of hive can there be witnessed a more beautiful sight than combs thus regularly worked to the bars; nor is it possible in any other way to have them so perfect and unbroken, when detached.

When it is required to operate upon a *stock-box*, a different mode of proceeding becomes necessary. In such an event, it is desirable to have ready a piece of board, of the same width and thickness as the top. In the middle of the day, unscrew the latter, sliding it sideways, the extra board filling up the vacancy as you proceed. In this way, only as much space

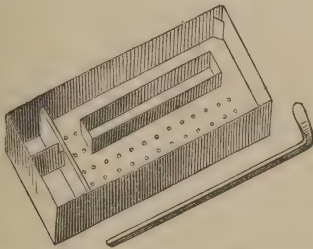
as is wanted to extract any given bar need be uncovered.

“A few puffs of smoke,” says Mr. Golding, “may now be blown down the sides of the comb to be taken out, which will intimidate the bees, and drive them away. A double-edged knife-blade, an inch and a half long, and three eighths of an inch wide, turned at right angles from the end of an iron rod of about a foot in length, is now passed down the edges of the comb, to detach them from the hive. After this is done, the comb may be easily lifted; such bees as still adhere to it being swept down into the hive as the bar is lifted upwards. Such operations as these are much less formidable than many persons believe. The fact is, the bees, when once intimidated by the smoke, may be done almost anything with. Quietness and a little tact are all that is required. When combs are taken out, they may be either detached from the bars at once, and the bars returned, or spare bars may be kept on hand wherewith to replace such as have been extracted.”

The advantage of moveable bars is apparent when it has become expedient to remove old combs from stock-hives, which, after two or three seasons, become black, filled with stale brood-bread, and altogether less adapted for their object than at first. These may be periodically extracted, the vacancies thus made being soon filled up with new combs. This removal of old combs should be done sparingly and in fine weather, in very early spring, before the main breeding time commences. If practised with judgment, a stock may be kept in a prosperous condition for a number of years. The bars may farther be made available in cases where one box has more and another less of sufficient store of honey. In

such an event, and as a substitute for feeding, a loaded bar or two may be taken and transferred from the one to the other, or from a super- to a stock-box. A brood-comb may in like manner be taken and inserted in a weak stock, to increase the population ; or supernumerary drone-combs can be extracted or changed. In any operation of this kind, however, it is necessary to bear in mind, that the stock-hive ought mainly to be furnished with worker brood-combs, so that the Queen-Bee shall have little inducement to leave it, and deposit her eggs elsewhere.

For the purpose of feeding the Bees, should it be requisite, a zinc or tin pan is provided, of convenient form, to go within the sunk part of the top of the stock-box.



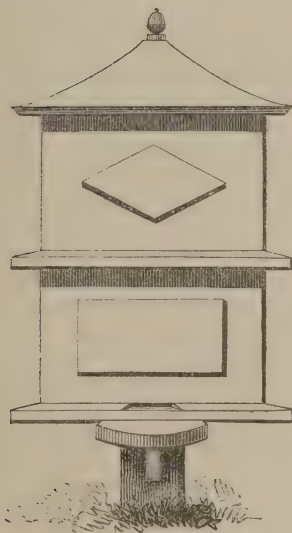
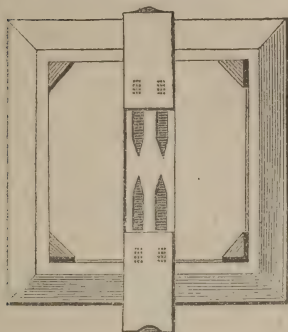
This pan is  $10\frac{1}{2}$  inches in extreme length,  $4\frac{3}{4}$  inches wide, and  $1\frac{1}{2}$  inch deep. At one end is a partition,  $1\frac{1}{4}$  inch wide, going down nearly to the bottom. Into this the honey or other food is poured, running under a wooden float, pierced with holes, and fitted within the bottom. A pane of glass rests on two angle pieces, at one end, and on the cross division at the other, all sunk a quarter of an inch ; and covering so much of the pan, beyond which the bees cannot get. The partition is strengthened in the centre by a stay, against which the glass rests.

Towards one side, at the bottom, is an opening, seven inches long, and half an inch wide, with a rim around it, half an inch high. This opening is placed over the corresponding one, communicating through the bars beneath. Remove the dividers, and the Bees have now access to the pan. In this way any quantity of food may be given. Afterwards, again insert the dividers, when the pan may be removed, with no danger whatever. The pan may be further made of utility as a condenser during the winter confinement of the Bees, as recommended at page 106.\*

The last hive described will, I think, be found to offer numerous recommendations to the amateur apiarian. Still, there may be many who might desire to see some of its advantages combined with a greater regard to economical considerations. With this in view I refer the reader to the engraving in the next page, in which the same general design is preserved, if not with an equal completeness, at least with more simplicity of detail. I have termed it the *Single Bar-Hive*, it being in itself only a stock-box surmounted by a cover, but of course intended to be worked on the depriving plan. The box is of similar inside dimensions and height as are specified

\* It may be found useful to give the following recipe of Mr. Payne, for making an excellent substitute for honey. To four pounds of lump sugar put a pint and a half of water, and let them boil about three minutes; mix it well with a pound of honey. To this many persons add, whilst cooling, about two tablespoonfuls of rum. The total makes six and a half pounds of food, on which bees will do well in seasons of deficient honey. Charges have sometimes been brought against zinc, as a material for a feeding pan; tending to acidity, as some assert. I can only trace the complaint to the use of sour beer and other fermented trash, often substituted for wholesome; food and the too general neglect of cleanliness.

## SINGLE BAR-HIVE.





at page 147, and fitted with bars in like manner. Being, however, more exposed to outward influences, it ought to be made of  $1\frac{1}{4}$  inch wood; a single window, made as recommended, may be placed at the back. For protection from wet, the top of the box should project all round, not less than  $1\frac{3}{4}$  inch: it is cut and recessed in the centre, as pointed out at page 148, so that similar dividers, and the same feeding-pan may be used. The dividers, however, will require to be made shorter, at the turned-up end, by about an inch. The floor-board has also a corresponding projection all ways, of  $1\frac{3}{4}$  inch. It must be chamfered from the box down to its edge; with a fall of  $\frac{3}{8}$  of an inch. The doorway is cut from the edge of the board, flat till it reaches the inside of the box, and then slopes gradually upwards. It may be  $4\frac{1}{2}$  inches in width. To contract the passage, according to seasons and circumstances, small blocks of wedge-shaped wood, of any required width, will answer the purpose, inserted under the edge of the box.

The cover will do if made of half-inch wood, nine inches high to the square of the roof; the outside dimensions being the same as in the stock-box. A slanting projecting roof forms a part of the cover. Under its projecting edges openings for ventilation must be cut, as directed at page 151. The cover thus made stands on the top of the stock-box, where it is retained in its place by four angle blocks, over which it is dropped upon a shallow rabbet, cut to prevent the admission of wet. This is further guarded against by chamfering the outside projection, as seen in the engraving.

We have already premised that the upper story of our edifice is intended solely as a covering. It is left to the option of the proprietor to introduce



within it any description of super-hive he pleases,—as caps or small hives of straw, wooden boxes, or glasses, as particularized at page 154. Into any of these the bees can be tempted by attaching to the top pieces of guide- or decoy-combs. Should a box fitted with bars be preferred, one of half-inch wood will do, with or without a glass top, as mentioned at page 149. It may be made  $10\frac{1}{4}$  inches square inside, and  $8\frac{1}{4}$  inches high, including the bars, of which there will be six.

As regards exterior appearance, the addition of plain raised panels, as shown in our engraving, is an improvement; at the same time they are of utility in tempering the action of the sun and weather on the boxes.

Respecting a stand for a hive of this kind, those who prefer one on the pattern described at page 151 can easily adapt it. We may here remark that we omitted, in its proper place, to say that the legs of such a stand ought to be sunk into the ground 8 or 9 inches. A more economical support can, however, be constructed with a single post, about 4 inches square, well placed in the ground, and standing in height 15 or 16 inches. Upon it a piece of thick wood, about 8 inches wide, must be nailed, and made firm with struts or angle-pieces beneath it. It may be 2 or 3 inches longer than the outside width of the floor-board, for which it is meant to be a table. Strong cross-bars ought to be screwed to the under side of the floor-board; and these must be so arranged, in point of distance apart, as to come on each side of the table; the whole being thus steadily retained upon it. The extra length of the table must be thrown to the front, where it is designed to form a projecting alighting platform for the bees.

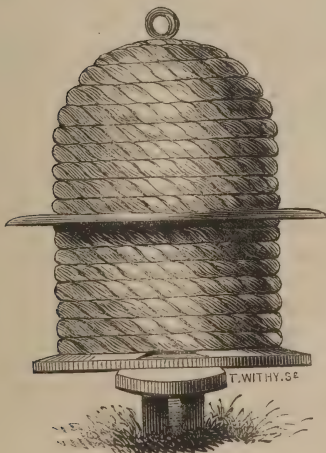
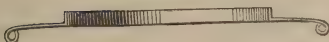
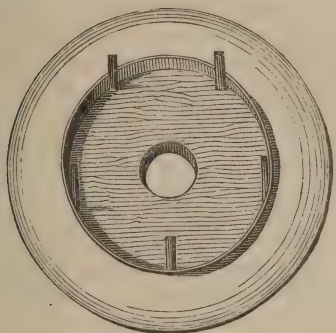
Everything should be fixed level; or, if there be a trifling inclination at all, it must be forwards. In some dishonest localities, it may not be misplaced here to say, that a small screw or two will give security, by connecting together the box and its floor-board. This may further be promoted by the use of a couple of turn-buttons, fixed out of sight, on the under side of the table, and engaging the bars under the floor-board.

It will, I think, be perceived that this hive, though substantial, is very easily managed, and by no means an expensive affair. Those, however, who study a still more rigid economy, may save a few shillings by the omission of the bars and the exterior panelings. In such instances, the stock-box should be made half an inch less in height. Even where there are no bars, pieces of guide-comb can be usefully attached to the roof of the box, to prevent the building of combs across the lateral openings. These apertures being cut precisely as in the bar-hive, must be the regulators of the position of the guide-combs.

Before I take my leave of the 'BEE-KEEPER'S MANUAL' (to which it will be perceived this is intended to be the sequel), I make no apology for an attempt to aid, not the amateur only, but the cottager, in his endeavour to add to his scanty resources the profit he may often make by keeping a few stocks of bees.

The annexed engraving shows a hive on the depriving system, with its cover, which will be thought by many to present a less uncouth appearance than usually meets the eye in cottage gardens. The diameter is supposed to be  $12\frac{1}{2}$  inches, and the height 8 or  $8\frac{1}{2}$  inches, all inside measure; made straight at the sides and quite flat on the top, as recom-

IMPROVED COTTAGE-HIVE.



T. WITHEY, SE

mended by Mr. Payne. The cover (and it is only intended as such) is of the same diameter as the hive ; of the inside height of nine to ten inches, and made like a common straw hive. Between the hive and the cover I introduce what, for want of a more distinctive term, I call a *Shade*. In form it is circular, and I have hitherto found no material for this better or cheaper than sheet zinc of moderate thickness, cut of such exterior diameter as to leave a projection round the edge of the hive of about three inches, and throwing off all wet from it. In the centre of the Shade is a circular opening twelve inches across, round which a rim is raised about half an inch high. The cover stands just outside the rim, which retains it in its place, at the same time that no wet can have admission. The outer edge of the Shade is turned on its under side over strong iron wire, with an inclination downwards, and is thus rendered firm. On the top of the hive there must be a round hole of four inches. This, when not in use, is covered by a rather thick circular piece of worked straw, like a small mat, fastened down with pins or skewers. It should be of a size just to fit within the twelve-inch opening in the Shade. The latter encircles it, and is thus made immoveable. When it is required to use the opening on the top of the hive, the straw mat must be removed, and its place supplied by a circular *adapting-board* of similar size and thickness, and with a four-inch central hole. The adapter may be made a fixture by means of a few short, sharpened pegs or pins, attached, near the edge, to its under side, and pressed down into the top of the hive. Those, however, who think it best to throw the weight from the centre may have the adapter made the full size of the hive ; in which case

the Shade and Cover can be held respectively in their places by sticking round the circle four or five moveable pegs or pins into the adapter, as shown in the engraving; or blocks may be attached to it, if preferred to the pins.

Some persons prefer two thin adapters (of hard wood) instead of one thick one, as being more convenient on the removal of a full super-hive, or box, when the combs are sometimes worked up through the central hole. Mr. Payne says: "a thin knife or wire will only have to be passed between them, and the danger of breaking the combs will be obviated." It will be seen that, in such cases, the pins must penetrate both adapters. Upon the adapter is placed the cap, small hive, box, or glass, in which the bees are to extend their works, the cover securing the whole.

A floor-board and stand may be provided as recommended at pages 160 and 161; the former with the same projection and chamfer, but made round instead of square. The whole, if kept well painted, will be very durable; nor will the stock-hive be overweighted and injured, as is now often the case, with the pots, pans, bricks, and other make-shifts commonly used as coverings. The trifling extra cost (and this is but little) would not, I think, be often thought an objection, where greater permanence and utility are taken into account, saying nothing of appearance.\*

For the purpose of feeding, the pan shown at page 67 may be used, or that at page 157 will do, placed upon the adapter. A piece of canvas or mat-

\* For the information of manufacturers it may be well to say that the Shades, when several are required, can be had at two shillings each.

ting may be introduced with advantage between the adapter and the pan, leaving an apperture for the bees only of the size of that into the latter. Those who prefer to lay aside the straw cover in winter, may substitute for this (or they may be used together) a zinc cap about two inches high, fitting over the upright rim of the Shade, like the top of a large canister, ensuring perfect security against the weather, and the intrusion of every foe.

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*The Amateur's Bar-Hives are made and sold by G. NEIGHBOUR and Son, 127, High Holborn, London. Also by Mr. BAXTER, Cabinet Maker, Bury, Suffolk.*

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